Review of the Literature Regarding Critical Information Needs of the American Public

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by the
University of Southern California Annenberg School for Communication and Journalism
in collaboration with the University of Wisconsin - Madison
on behalf of
the Communication Policy Research Network (CPRN)
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Executive Summary

Overview

In response to the Federal Communications Commission's request (FCC12Q0009), the University of Southern California Annenberg School for Communication and Journalism in collaboration with the University of Wisconsin-Madison Center for Communication and Democracy, together with a national, non-partisan, multi-disciplinary network of social scientists, legal scholars, journalists, and communication experts, the *Communication Policy Research Network* (CPRN), presents a critical literature review and assessment of the provision of, and barriers to, critical information needs for all Americans in the contemporary media ecosystem. This report is prepared in the context of radical and far-reaching changes in the ways all Americans are able to meet their information needs, changes that are both worrisome and promising. [see FCC Report on Information Needs of Communities, July 2011]

The report presents a multidisciplinary overview of available data and literature from the past two decades covering a wide range of social science and communications research approaches that can complement existing FCC research on ownership, localism, and diversity, and inform stated FCC goals (as per Sec. 257) to 'identify and work to eliminate barriers to market entry,' to develop policies to advance the goals of diversity, to assess the need for government action and targeted policies to address existing gaps in media ecosystems' ability to serve and deliver critical information to the American public.

We address three core questions:

1. How do Americans meet critical information needs?
2. How does the media ecosystem operate to address critical information needs?
3. What barriers exist in providing content and services to address critical information needs?

The goal of the review specifically was to summarize research on the diversity of views available to local communities, on the diversity of sources in local markets, the definition of a range of critical information needs of the American public, how they are acquired as well as the barriers to acquisition. Having considered multiple frames of reference that take into account current conditions and trends, we identify existing knowledge and gaps in information. This research points to the importance of considering multiple dimensions and interactions within and across local communication ecologies rather than focusing on single platforms or categories of owners. The converging media environment together with demographic trends and evolving variations in communities of interests and culture among the American public require a more complex understanding of these dynamics as well as of the populations affected by them, in order to effectively identify and eliminate barriers to market entry and promote diversity.

The review therefore recommends the application of a wider set of analytic tools and performance metrics to measure the provision of and barriers to information in the public interest for all the pluralities of the American public, including but not limited to women and marginalized or at-risk communities. We seek to elucidate changes in demographics and in media systems, and the relations between them.

Summary of Analytic Approach

Given a rapidly changing demographic landscape in the United States, it is essential to refine and extend our conceptions of diversity of ownership and participation in the production, distribution, and means of access to critical information. We need new definitions of participation that more accurately reflect the multidimensional pathways by which the American public engages with media and critical information. Barriers to market entry, participation, and access are not only ones of traditional econometric measures of ownership. Our review of the literature notes that, while still relevant, the concept of a binary "digital divide" does not adequately reflect the real impact on communities of inclusion or exclusion from increasingly complex information networks. Employment and decision-making processes and patterns within the media industry matter as well, as does the relative availability of public media and information sources.

Beginning in mid April 2012, Co-Principal Investigators Wilson (USC), Friedland (UW-Madison) and Napoli (Fordham) and Weil (USC) and a team of graduate researchers led by Katherine Ognyanova (USC) systematically examined literatures in the following disciplines for any possibly relevant scholarship: communication and journalism, economics, sociology, political science, geography, urban studies, urban planning, library and information science, health, transportation, environmental science, education, emergency and risk management. We solicited bibliographies from scholars from across the U.S., and compiled a master list of more than 1000 potentially relevant sources and abstracts. Senior scholars narrowed this literature to nearly 500 systematically reviewed and catalogued sources that make up the Annotated Bibliography.

From this exercise, as well as the preceding two years of discussions with national experts within the CPRN network and beyond, it became clear that an interdisciplinary framework such as the emerging communication ecological paradigm that analyzes the production and use of media and information holistically and that provides a more variegated, in-depth understanding of categories of diversity of voices and participation within and across communities, lends itself particularly well to the set of questions posed by the FCC. It incorporates elements from a wide range of disciplines cited above, including economics; captures the interactive nature and complexities of demographic and information trends across the entire media ecosystem; and allows for a translation from the local community level to the national aggregate levels of data necessary for policy making.

Key Findings

I. <u>How Americans Meet Their Critical Information Needs</u>

Americans live in communities of place, despite the exponential penetration of new forms of digital technology into every corner of everyday life. Whether South Los Angeles or rural South Carolina, our needs for information are shaped by the places that we live in, our blocks and neighborhoods, cities or suburbs, and the people we live with. (For example, the local zip code is the best predictor of one's health status.) The groups we are a part of also shape our information needs in many ways: by ethnicity, race or immigration; by religion; by occupation or income; by gender and family situation; our health or abilities. Every individual American's needs are built up from intersections of these memberships as well as individual tastes and preferences. The challenge in discussing how Americans meet their information needs is to capture this diversity while framing a social scientific approach that can generalize to inform policy for a rapidly changing America.

As we note in this report, America is changing so rapidly that it challenges our very definitions of diversity. Our traditional understandings are organized around the concepts of majorities and minorities and as long as significant barriers continue to exist to full participation in society, including the meeting of information needs of communities and groups, we will need to continue to identify and overcome these barriers. But we are moving toward an America of pluralities. By 2042 there will be no single majority group. Moreover, within every population group or community there exists considerable variation across socio-economic status, origin, religious and other beliefs and interests. In this report, we focus on the present –the specific, varied needs of groups in communities and the barriers to meeting them– but also the future, the information needs of the plural America that we are becoming. These changes pose immediate analytic challenges for policy makers and regulators.

Available data and research indicate that:

1) There is an identifiable set of basic information needs that individuals need met to navigate everyday life, and that communities need to have met in order to thrive. While fundamental in nature, these needs are not static but rather subject to redefinition by changing technologies, economic status and demographic shifts.
2) Low-income and some minority and marginalized communities within metropolitan and rural areas and areas that are "lower-information" areas are likely to be systematically disadvantaged in both personal and community opportunities when information needs lag or go unmet.
3) Information goods are public goods; the failure to provide them is, in part, a market failure. But carefully crafted public policy can address gaps in information goods provision.

Defining Critical Information Needs

Critical information needs of local communities are those forms of information that are *necessary* for citizens and community members to live safe and healthy lives; have full access to educational, employment, and business opportunities; and to fully participate in the civic and democratic lives of their communities should they choose. To meet these needs, communities need access to the following eight categories of essential information, in a timely manner, in an interpretable language, and via media that are reasonably accessible, including information about:

1. emergencies and risks, both immediate and long term;
2. health and welfare, including specifically local health information as well as group specific health information where it exists;
3. education, including the quality of local schools and choices available to parents;
4. transportation, including available alternatives, costs, and schedules;
5. economic opportunities, including job information, job training, and small business assistance;
6. the environment, including air and water quality and access to recreation;
7. civic information, including the availability of civic institutions and opportunities to associate with others;

8. political information, including information about candidates at all relevant levels of local governance, and about relevant public policy initiatives affecting communities and neighborhoods.

We have identified *two broad sets of critical information needs*: (1) those fundamental to individuals in everyday life, and (2) those that affect larger groups and communities. They take different forms across the eight core areas of need that we have identified. Among the most basic are needs for information about the myriad elective offices in even a small American community: without basic information about candidates and their positions Americans do not even have the opportunity for informed participation in democratic life. Similarly, as public policy decisions are made across the range of areas we have discussed, citizens need access to the policy choices that face them, notice about opportunities to participate, and information on decisions that will affect them.

Differentiation across communities

Neither information needs nor the way that they are met are distributed equally across communities. Literature from demography in sociology and policy studies shows that American communities vary widely by size (metropolitan [367], micropolitan [576], or rural area); racial and ethnic composition; percentage of immigrants; rates of population growth or loss; density; and income distribution. The overall composition of a given community across these dimensions is a significant determinant of both its overall pattern of community information needs and of the degree to which these needs are likely to be met. *We identify two major axes of differentiation: within and between communities*.

For the purposes of this study, we define communities primarily in geo-spatial and demographic terms but recognize that communities also represent common sets of identity, cultures, and beliefs that contribute to significant variations within and across communities. Such in-group variations must be taken into account in assessing and responding to critical information needs.

Within a given region, low-income, minority (defined broadly), the disabled, and non-English speaking or other at-risk communities especially continue to be disadvantaged in the meeting of community information needs, although we stress, existing research makes it difficult to demonstrate precise patterns of disadvantage and how they vary within and across communities. The literature points to several challenges in particular such as *reduced access to basic information infrastructure* (lower-rates of home computer ownership, reduced access to broadband and lower speed broadband, greater reliance on mobile phones but lower rates of smart-phone use, and poorly equipped libraries in low-income communities, despite heavy use); and f*ewer opportunities for learning advanced computer skills*, even while these skills are growing in importance for education, job-seeking, health information, information on local schools, and other basic everyday needs.

There is evidence of fewer regional and local media, hyperlocal news websites, information blogs, and online sources of neighborhood news in low-income communities, although the evidence is not yet systematic. Although much has been made about the ability of new media to fill the gap left by the decline of traditional reporting, it seems likely that there will be significant gaps, or even “news deserts” in some low-income communities. This may be partly offset in some non-English speaking neighborhoods, although there is no robust general evidence that non-English news fills the local news gap.

As low-income communities become information islands, partly cut off from both surrounding neighborhoods and the larger community information system, this can have systematic consequences for larger resource systems (e.g.: negative *perceptions* of a neighborhood as stronger predictors of long-term poverty than actual poverty indices (Sampson 2012)). Community information needs are met through a mixture of private and public goods. But lower-income communities are particularly dependent on informational public goods, which are systematically under-produced. Limited case evidence demonstrates that where communities have systematically invested in the information needs of low-income communities, as in Seattle, gaps can be at least partially bridged (Friedland, 2013). Such findings may place a greater burden on public broadcasting platforms in less privileged neighborhoods.

We have argued that economic and social differentiation within communities yields differences in the information needs of sub-populations. But, in a nation as varied as the U.S. there are differences in information needs and how they are met *across* geographic or metropolitan areas as well. Increasingly, in an information society, those communities that thrive are those with a highly educated population and superior access to both information infrastructure and more developed local news ecologies. Metropolitan typologies (which include rural communities) developed in the past several years, ranging from the Brookings Institution (2012) to those of James Gimpel in Patchwork Nation (2004, 2010), while not agreeing completely on community typologies derived from factor analysis, demonstrate that there is an ordering of communities in the U.S. with information status operating as one of the most significant independent variables predicting economic growth. Those that thrive score high on multiple indicators of information access and robustness; those that struggle are low. Thus information inequalities within communities can have both short and medium term consequences for individuals' access to basic opportunities, and potential long-term consequences for community development. While causality is difficult to determine, many scholars argue that ready access to high-quality actionable information is an important determinant of economic and societal outcomes.

With regard to how Americans meet critical information needs, we thus find that:

1) While most of these needs are acknowledged in some form in the literature we examined, if indirectly, there is a *severe shortage of research* that directly addresses whether and how they are being met, particularly in the area of health information, local educational communication and local political coverage, especially under emerging demographic and media conditions.
2) This is particularly true for minority communities, non-English speakers, the disabled, and those of lower-income.
3) There is very little literature on how these information needs, taken together, are met at all levels of the local community information system: mass media, new online media, community and group networks, and interpersonal communication.
4) Finally, the correlation of lower performing metropolitan and rural areas with lower levels of education and higher percentages of non-English speakers and low-income residents suggests that meeting basic information needs may be one critical step towards raising the

quality of life for those cities below the median. How these needs might be met is a matter for public policy, and increasingly salient as America continues to transition to an ever more information and knowledge-based society.

II. Critical information needs and the media-ecosystem

Availability and accessibility of relevant news and information across media platforms

The review examined whether and how different media are serving the critical information needs of communities (with an emphasis on "critical"). Our findings rest on the large and wide-ranging body of literature that has examined the performance of different media with regard to the provision of one or more types of information serving the critical information needs of communities. Most of the work in this area has involved the assessment of an individual media platform. Thus, for example, there is a large body of literature that has examined the provision of local news and public affairs programming by local television stations. Some of this work has focused on the analysis of large samples of media outlets; while other work in this area has involved detailed qualitative analyses of a select few outlets (a common approach for research focusing, for example, on community radio and public access cable). Importantly, we are beginning to see work that systematically examines new media platforms such as blogs, Twitter, and YouTube in an effort to assess if and how they are addressing communities' critical information needs, but such research remains sparse at this point. Other elements of this literature have been very subject matter or issue specific. Thus, for instance, studies have addressed questions such as how print and online media have covered a particular issue affecting the Native American or Hispanic communities.

Based on this review, we note the following about availability and access of relevant news:

1) The traditional media outlets have failed to find a convincing business model and remain, and especially in the print industry, on a downward path.
2) Even in the midst of declines in the face of new media platforms, legacy media continue to provide the bulk of the news "inputs" that circulate through a local media ecosystem. This pattern is changing substantially and quickly over time, which points to the need for continued research that seeks to map the production and flow of original news and information through the various platforms that serve a local community.
3) Different media platforms definitely appear to serve different social functions, in terms of how they are used by both producers and consumers of information in local communities; and these functions are also likely to change over time.

Participation of women and minorities in media content production and distribution industries

We examined the issue of the effects of women and minority participation (in terms of both ownership and employment) on how media outlets and platforms serve the critical information needs of local communities. Such issues have been a focal point of communications policymakers for decades, in contexts such as minority and female ownership policies, employment diversity policies, and spectrum allocation policies. A substantial body of literature has, consequently, developed around these issues, forming what one meta-analysis reviewed for this study termed the “minority ownership-employment-content triangle.” Once again, this literature can be characterized by a variety of methodological approaches, ranging from large-scale analyses of media ownership and content data (for example, in an analysis of the relationship between minority ownership and programming formats in radio), to in-depth qualitative analyses of minority-owned newspapers.

There are, however, some important gaps in the literature:

1) The operationalization of minority groups has focused quite heavily on groups such as Hispanics and African-Americans; whereas other minority groups, whether it be particular ethnic groups, or other potentially marginalized groups (such as people with disabilities), have been the focus of little, if any, research seeking to establish relationships between ownership, employment, and content. As communities continue to diversify across a range of criteria, research in this area needs to follow suit.
2) Much of this literature employs fairly superficial measures of the extent to which different communities’ critical information needs are being met. Future research should ideally build upon the more explicit delineations of the critical information needs outlined in Section 1 of this review to construct more robust assessments of the ownership-employment-content relationship.
3) It is also important to emphasize that research in this vein has -- as of yet -- moved quite slowly into the online arena. Our understanding of the dynamics of the ownership-employment-content relationship in the new media space continues to lag far behind our understanding of these relationships in the traditional media space.

III. <u>Existing Barriers to Address Critical Information Needs</u>

Barriers to Participation in Content Production, Distribution and/or Communication Technologies Adoption

A key theme within the literature discussed above on minority and female participation in various aspects of media content production and distribution is that, historically, a number of barriers have hindered such participation. Consequently, this analysis focused on the literature that explicitly addressed the range of barriers to participation, across multiple levels of analysis. Some of these barriers emerge from marketplace dynamics. They include issues of access to capital, as well as the dynamics of the advertising marketplace, which frequently appear to demonstrate the under-valuing of minority audiences -- and as a result under-provision of content addressing the critical information needs of minority communities. Organizational-level factors, such as media organization hiring practices, also frequently emerge in this literature as a barrier to full participation.

In an environment in which technology is presumably democratizing, to some extent, the opportunities to participate in the production and distribution of media content, it is increasingly important to look beyond the traditional market and organizational-level impediments. One must also consider also individual-level barriers to participation, such as access to infrastructures and hardware, as well as access to the training and education necessary to utilize these infrastructures and hardware effectively. From this standpoint, it is important to emphasize the recent trajectory of the substantial digital divide literature, in which such divides in access to technology and infrastructure are seen not just as impediments to accessing relevant news and information, but also impediments to *participation* in a wide range of dimensions of social and economic life. We insist that 'access' alone is a pre-digital formulation while 'participation' reflects more accurately the nature of the American public's engagement with the media ecosystem.

Regarding barriers to market entry and participation, this review suggests that:

1) The concept of the "information needs of communities", like minimal standards of telecommunications public service and the digital divide, is very much an evolving concept and a function of change in technologies, public expectations and other factors over time.
2) Technology access and diffusion are necessary but insufficient mechanisms for ensuring true diversity of participation in contemporary media ecosystems, as a growing body of literature compellingly illustrates.
3) Future research needs to develop explicit definitions of those aspects of participation in contemporary media content production and distribution that are presumed to have the greatest significance in relation to other aspects of participation in economic and political life and to rigorously explore those relationships. A core body of research has already developed in this area for future research to build upon.

Performance Metrics and Methodologies for the Analysis of Critical Information Needs

The increasing complexity of local media ecosystems is leading to perhaps unprecedented challenges for the design and implementation of rigorous assessments that can meaningfully inform policy making. In an effort to inform future research, this analysis examined the wide range of methodological approaches that have been employed in the assessment of media ecosystems. We operated from the basic premise that the increased complexity of local media ecosystems warrants the consideration of the full range of available analytical approaches to understanding how these ecosystems are structured and how they function.

We present a series of performance metrics and methods that we believe appropriate to further analyze these questions. They range from human ecology models, developed and tested for 90 years that incorporate econometric and organizational theoretical analyses, to descriptive studies; from demographic and economic methods to social network analysis.

The review of available metrics and methodologies leads us to assert that:

1. A number of potentially relevant analytical approaches have thus far been employed primarily at the national level; though these approaches often appear to have the potential to be adapted to the analysis of more localized communities.
2. The analyses producing the most in-depth information have often done so via methodological approaches that are quite narrowly focused in terms of the number of communities analyzed. This of course raises the question of if/how such analytical approaches might be calibrated to a sufficient scale to better inform policymaking, given limitations in available resources.
3. There are a number of existing data sources that have been compiled for other large-scale research projects that could prove useful in the design and implementation of future research examining the structure and functioning of local media ecosystems.

Recommendations

1) The proliferation of new media technologies, the relative market share decline of legacy media, turbulent economic changes and the acceleration of community diversification have created new barriers to Americans' abilities to fully meet their information needs. We, therefore, recommend the FCC devote greater attention to these barriers and to opportunities as part of their statutory mission. Barriers range from insufficient broadband penetration, under-representation of some groups in media ownership and –equally important- employment, to insufficient media literacy by citizens in disadvantaged groups, among others.

2) Reference categories such as "minorities" no longer adequately reflect the pluralistic demographic and socio-economic shifts in the United States, nor does "one size fit all." At the very least, policy researchers must take into account variations within communities and specific populations in identifying and designing responses to critical information needs.

3) Regulators should recognize that the costs of network exclusion are borne not only by the excluded, but also by the society at large, and increase exponentially with the continued growth and expansion of information and communication networks in society.

4) Policy-relevant research must capture the increasingly complex functioning of local media systems in ways that fully account for the role played by *all* relevant stakeholders, the interconnections and interdependencies that exist among media platforms that embed the analysis of media systems within the analysis of the ways different kinds of local communities actually function, and the extent to which local community information needs are being effectively served.

5) The traditional approach of large-N econometric analyses of media competitiveness do not fully capture the extensive range of relevant factors in America's emerging digital, distributed media ecosystem, and should be complemented by additional analytic models such as a communication ecological approach (see below).

6) Future research should develop and implement a multi-level analytical framework that could be employed in assessing local communities, and the extent to which barriers to participation are affecting the extent to which their critical information needs are being met. It should

   a) seek to understand the emerging patterns of information production, distribution, and consumption that are developing both within and across media platforms (both traditional and new media platforms);

   b) explore these patterns from both economic and non-economic perspectives (given the rise of many "informal" media economies and the increasing prominence of various forms of user generated content); and

   c) supplement traditional large-scale quantitative approaches with policy-relevant, methodologically integrated approaches that can drill down into the complexities surrounding the questions of if and how local community information needs are being served and whether any barriers exist to the fulfillment of these information needs.

7) A model of research rooted in the communication ecology approach can and should be developed, fully incorporating the relevant research problems and methods indicated by the

other approaches reviewed. This model should be valid, replicable, and parsimonious, building on a foundation of existing demographic models and data, and incorporating a range of media measures, including surveys, content analysis, social network analysis, and qualitative research. It should unite the range of approaches as much as possible and avoid methods that are outmoded. This is true of both surveys that rely on polling rather than social scientific techniques, and outmoded models of content analysis.

8) Developing robust and testable indicators of performance will be essential, both for the purpose of internal evaluation, and in order to allow policymakers and communities to independently evaluate the overall effectiveness of approaches to meeting community information needs in order to improve community performance where indicated. Multi-leveling modeling survey research, qualitative comparative and social network analysis, among other methods, can yield a valid set of comparisons among communities.

Conclusion

This review has demonstrated that there are clear and significant information needs of Americans at the individual and community level. A large body of research suggests that many of these needs are not being met, and that access to information and, equally, the tools and skills necessary to navigate it are essential to even a minimal definition of equal opportunity and civic and democratic participation. Further, both traditional and contemporary analyses have demonstrated access to information in multiple fora and disciplines to be essential to community economic wellbeing and democracy. Exclusion from the networked benefits of participation in an information society are not simply additive, but they may be exponential, with long term consequences for minorities, non-English speakers, those with low-income, and the disabled. But beyond the problems generated by exclusion, full integration into the information economy offers unique opportunities to better inform and educate the nation of pluralities that we are rapidly becoming.

The U.S. *is* becoming a more diverse society, inexorably, and the communication that allows groups to meet and express their everyday needs, both to those like ourselves and to those who are different is an essential component in binding a diverse nation together. In a federal democracy, the challenge of communication participation begins in local communities, and must stay rooted in local communities. Despite the vast amount of information, entertainment, and basic human connection that the Internet provides, it cannot by itself substitute for meeting the local information needs of American communities. We are blessed so that any one of us can log-on, either at home or the local library, and go to a CDC website and get health information that was locked in medical journals only a few short years ago. But, if we have a problem, if we are sick or need well-baby care, in the end, we are faced with finding a doctor in our own communities. Parents deciding whether to send their children to neighborhood school or a charter school across the city need information on their own local schools. Monster.com may have a wealth of jobs for engineers and managers, but a lower-skilled worker, looking for steady employment, needs information about jobs within relatively easy reach.

This is not, of course, an either/or situation. The information needs of local communities are not at odds with the national or global community. But they are unique and specific. That is why we recommend that the FCC conduct serious, rigorous, research into whether and how these needs are being met. We have recommended that modeling community communication ecologies that can investigate whether and how local information needs are met is a critical first step to understanding how markets, government policies and individual and group actions can work together to meet the information needs of their communities. We believe that such an approach will also meet the standards for *rigorous comparability*, *parsimony*, and *economy*.

I. Introduction

The contemporary media environment is growing increasingly complex, as technological change and demographic trends impact the dynamics of media usage, production, and distribution in a variety of ways. Content is produced on – and circulates across – a growing array of media platforms, with as-yet unclear inter-relationships and inter-dependencies between these various platforms. Content emerges from a greater array of sources, as technology has facilitated what has been termed a "de-institutionalization" of media production and distribution. Media users face increased choice in terms of the content and access platforms available to them; and in terms of the extent to which they want to engage with media as both consumers and producers of information.

While on the surface these changes all suggest a media environment that is much better equipped to meet the diverse information needs of an increasingly diverse populace, there are also indications that these transformations are undermining the traditional economic and organizational structures that produce the bulk of the critical information that circulates within local communities. Traditional news organizations, such as newspapers and local television stations, for instance, are in many cases scaling back or eliminating their investment in news gathering operations; and in some instances are shutting down altogether. Certainly, the new media environment, with its much lower barriers to entry in terms of content production and distribution, has facilitated the development of a wide variety of alternative information sources that often operate under very different economic models; but whether and how these alternative information sources are effectively supplementing the apparent declines in traditional information sources (in terms of both what the produce and the extent to which audiences use them) remains difficult to determine (see, e.g., Nagler, 2007).

These large-scale changes impacting contemporary media pose particular challenges for policymakers seeking to thoroughly monitor local media markets in ways that can effectively guide policymaking. Indeed, it is important to recognize that as much as the nature of local media markets is changing, the need to assure that communities' critical information needs are being well served, and to address any barriers that might be affecting the extent to which those critical information needs are being served, remains.

The following review of the literature therefore aims to contribute to three core questions:

1. How do Americans meet critical information needs?
2. How does the media ecosystem operate to address critical information needs?
3. What barriers exist in providing content and services to address critical information needs?

It would appear that the dramatic changes confronting local media markets compel the exploration of analytical strategies extending beyond the traditional analytical approaches that have been employed to assess diversity, competition, and localism. This is not to say that the traditional methodological approaches, and their traditional points of focus, lack relevance today. However, the complexity of the changes taking place and the shifting nature of the key concerns that drive policy makers suggest that these analytical approaches should become integrated into a broader analytical framework that: a) seeks to understand the emerging patterns of information production, distribution, and consumption that are developing both within and across media platforms (both traditional and new media platforms); b) explores these patterns from both economic and non-economic perspectives (given the rise of many "informal" media economies and the increasing prominence of various forms of user generated content); and c) supplements traditional large-scale quantitative approaches with policy-relevant, methodologically-integrated approaches that can drill down into the complexities surrounding the questions of if and how local community information needs are being served and whether any barriers exist to the fulfillment of these information needs.

Clearly then, policy-relevant research must capture the increasingly complex functioning of local media systems in ways that fully account for the role played by all relevant participants; that seek to understand the interconnections and inter-dependencies that exist between participants (e.g., content flows); and that embed the analysis of media systems within the functioning of local communities and the extent to which local community information needs are being effectively served.

As the Knight Commission (2009) noted in its influential report on the information needs of communities, policymakers and communities alike "lack good tools to assess the quality of local information ecologies. There are no widely accepted indices for comparing different communities' ecologies or determining whether information flow within a particular community is improving or degrading" (p.39). This paper is intended as step toward addressing this gap. It is a starting point for crafting next-generation policy-relevant analytical tools for assessing the extent to which diverse community information needs are being effectively served in the contemporary media environment, and for assessing whether any barriers to participation in contemporary media systems exist that affect communities as a whole or particular subsets of these communities, such as women and marginalized populations. Presented here is a thorough review of the relevant research conducted to date, as well as an assessment of the currently available data sources that could be employed to facilitate robust analyses of local media systems.

This review is multi-disciplinary in its scope, in recognition of the extent to which these issues cross a number of disciplinary boundaries. Thus, research from traditional policy-relevant fields such as economics and law will be assessed alongside the literature from other relevant fields such as sociology, political science, and communication. The increasing complexity of contemporary media systems requires that a wide net be cast in an effort to identify the broadest possible range of potentially useful analytical approaches going forward. At the same time, however, this review remains tightly focused on the issues of the diversity of communities' information needs; how these needs are being served by various elements of contemporary media systems; and what barriers to access and participation might be affecting all or some sectors of local community. The ultimate goal is to build toward working proposals regarding the development of systematic and robust assessment tools that employ the full range of relevant methodological approaches and that could serve as meaningful guides for policymakers seeking to assure that a sufficient diversity of sources, ideas, and viewpoints exists at the local level; and to develop (and assess) policy interventions should shortfalls in any of these regards be identified.

The explicit questions that underlie this analysis are as follows:

1. What media provide critical community information, regardless of how they are used by citizens?

2. What is the effect of women and minority participation in media content and production industries, including ownership and employment, on the ability of media ecologies to meet critical information needs of communities?
3. What are the barriers that Americans face in participation in content production and distribution industries or adopting communication technologies?
4. What are the critical information needs of communities as a whole and of underrepresented and under-served segments of the population?
5. What metrics have been or may be employed to measure these needs and whether they are being met?
6. What is the differentiation of community information needs and the extent to which they are met across the dimensions of ownership structure, civic/community membership, and platform?

As should be clear, these are wide ranging questions that in some instances have important points of intersection. As a result, there are a number of instances in this report in which discussions of particular issues, or studies recur across multiple sections of the document.

The process for identifying the relevant literature that contributed to answering these questions was as follows: Beginning in mid April 2012, the research team systematically examined literature in the following disciplines for relevant scholarship: communication and journalism, economics, sociology, political science, geography, urban studies, urban planning, library and information science, health, transportation, environmental science, education, emergency and risk management. In addition, bibliographies were solicited from scholars from across the U.S. A master list of more than 1000 potentially relevant sources and abstracts was compiled. This compilation of materials was then narrowed down to the approximately 500 sources that are reviewed in this document and in the attached Annotated Bibliography.

In recognition of the number and breadth of the questions that needed to be addressed in this review, and of the dramatic changes that have taken place in the American media system in recent years, this literature review was confined to roughly the past 20 years of relevant research. It is also important to note that this survey of the relevant literature was not confined exclusively to academic publications. The search strategy also included relevant research produced by government agencies, foundations, public interest organizations, and industry groups. Also, wherever possible, this review has sought to identify relevant data sets that could prove useful in future research.

Structure of Literature Review

The organization of this literature review deviates somewhat from the order of the questions posed by the FCC in its RFQ. This was done in order to most effectively accommodate the interconnections that emerged across the various bodies of literature reviewed for this analysis, and to most effectively build toward the recommendations contained within the concluding section. This review is organized as follows:

The first section establishes an analytical foundation in the relevant literature on the critical information needs of communities. This section seeks to identify the key elements that comprise the notion of critical information needs, and to review the relevant literature that examines how individuals and communities meet their critical information needs. The second section then examines how these critical information needs differ across demographic groups. As this section illustrates, as the populations within individual communities grow increasingly diverse, the range of information needs that must be fulfilled become increasingly diverse as well. The third section focuses on how different media platforms and outlets meet the critical information needs of communities. This section reviews the literature that has assessed media performance across a wide array of platforms, contexts, issues and critical information needs.

The fourth section focuses specifically on media performance in relation to the needs of traditionally under-represented groups such as women and minorities. In particular, this section examines the literature that has investigated the fundamental question of whether the nature of the news and information provided by individual media outlets is affected by the demographic characteristics of those who own and/or operate the media outlet. The fifth section, builds on this review and examines the literature that has examined the potential barriers to entry to participation in media content production and distribution affecting women and minorities. This analysis considers potential barriers at multiple levels, including marketplace dynamics, media ownership and employment impediments, and individual-level access to relevant technologies and infrastructures -- as well as the training and skill sets necessary to take full advantage of these resources. The sixth section delves into the various methodological approaches that have been employed to assess how effectively communities' critical information needs are being served. This section casts a wide net in terms of disciplinary and methodological approach in an effort to identify the full range of methodological approaches that could prove useful in future research. The final section puts forth some methodological recommendations for future research.

II. Critical Information Needs of the American Public

1. Defining Critical Information Needs

Communities are central units of political, civic, and cultural life in the United States. Their centrality is enshrined in our governmental structure as a federal democracy. The U.S. is built for self-governance from below, beginning at the community level. As such, localism is more than a prescriptive doctrine it is a cornerstone of American life. That said, American communities vary tremendously on many dimensions: region, scale, economic vitality and occupational composition, ethnic and racial makeup, media environment, and not least, the many ways in which these factors interact. In Section 2: Differentiation Among Demographic Groups, we will try to make sense of the interactions between these factors. Our initial goal, however, is to enumerate the basic information needs shared by all communities regardless of variation. These needs are fundamental for individual residents to live full and decent lives, with access to a broad range of basic opportunities for health, education, economic advancement, public safety, and environmental quality. But, as we will argue further in this report, they are also necessary for sustainable communities themselves.

The Knight Commission on the Information Needs of Communities (2009) identified four basic needs of communities that depend on information. Communities need to coordinate a range of activities, from elections to emergency response. They need to solve problems in health, education and economic development. They need to establish systems of public accountability and, finally to develop a sense of connectedness (p. 9). These are fundamental functions of community information (although scholars define and divide them somewhat differently).

Our categorization of critical information needs was constructed by first examining a broad set of literature, and consulting experts in multiple fields, to identify a core set of eight areas. Our method was to enumerate the core needs that citizens and residents in any community in the United States would have to navigate in the course of their daily lives. These are also areas in which individuals need to make informed decisions, both as consumers (of public and private goods) and as citizens.

The discussion of critical information needs of local communities is spread throughout multiple literatures, including communication, sociology, political science, economics (primarily of media), library and information science, urban studies and urban planning, geography, environmental studies, public health, and education (among others). Each of these disciplines and literatures brings unique substantive questions, theoretical perspectives, and methodological orientations to the study of information needs of local communities, and we briefly enumerate their respective contributions here.

The field of mass communication and journalism address how communication flows to and through individuals, groups, organizations, and institutions, as well as the ways that media at different levels (metropolitan, neighborhood, individual and small group) and different platforms (legacy media, the Internet, social media) reach different layers of individual and society, shaping public opinion and delivering information.

Sociology addresses basic structural and demographic issues, including how communities are composed (in terms of race, ethnicity, income, education, etc.) and how resources, including information, are distributed. Urban sociology specifically addresses the differential access to resources in the city, and the "neighborhood effects" of layers of resource distribution. Urban studies and urban planning address the changing organization of metropolitan life (across city, suburb, exurb and rural areas), the drivers of resource distribution in urban regions, including information and policy, and the effects of changing demographic composition on metropolitan regions, including comparatively.

Political science illuminates both the general processes of political communication, including the basic preconditions for an informed citizenry, voting, and civic participation, but also the effects of differential access to information on these processes. The subfield of political geography examines how regional composition (nationally and by metropolitan type) affects political life. Geography addresses the spatial determinants of both policy and access to resources.

Economics, particularly media economics, shapes our understanding of how varied market structures produce critical information needs, how these needs are or not public goods, and whether public goods are produced and under what conditions, as well as the effects of media structure, ownership, and employment on the provision of critical information needs.

The field of library and information sciences allows us to understand the patterns by which information is delivered to specific groups and populations, and their patterns of use, while specific substantive studies of information delivery in environmental studies, public health, education, and risk management address whether and how field specific information needs are conceptualized and addressed, and, in some cases, the effects of information delivery on various groups.

We have examined each of these literatures for studies that bear on our eight core areas of critical information needs. Rarely, studies spoke directly to these needs *per se*. More often, the literature addressed specific problems related to the field. We were conservative in linking literature to the eight core needs. To be included, a study had to either address one of the eight need areas directly, or have a clear secondary relationship to the area under consideration.

This section first defines the eight need areas. It then proceeds through them individually. We conclude with a discussion of the problem of summarizing information on these needs for further research. While there have been several major reports in the last several years discussing the information needs of communities – most significantly the Knight Commission (2009) and the FCC report prepared by Steven Waldman, et. al. (2011) –, there has been relatively less rigorous debate on defining those needs, how they vary across different types and scales of communities, and why they are critical. This review looks to the literature in eight areas that are arguably critical to all Americans living in local communities, regardless of scale, section of the nation, or demographic composition, in order to establish broad agreement on a set of basic information needs shared by all communities. The needs that we review range from those that are most concrete and specific to those that are broader and more general:

1. *Emergencies and Public Safety*: Individuals, neighborhoods, and communities need access to emergency information on platforms that are universally accessible and in languages understood by the large majority of the local population, including information on dangerous weather; environmental and other biohazardous outbreaks; and public safety threats, including terrorism, amber alerts, and other threats to public order and safety. Further, all citizens need access to local (including neighborhood) information on policing and public safety.
2. *Health*: All members of local communities need access to information on local health and healthcare, including information on family and public health in accessible languages and platforms; information on the availability, quality, and cost of local health care for accessibility, lowering costs, and ensuring that markets function properly, including variations by neighborhood and city region; the availability of local public health information, programs, and services, including wellness care and local clinics and hospitals; timely information in accessible language on the spread of disease and vaccination; timely access to information about local health campaigns and interventions.
3. *Education*: Local communities need access to information on all aspects of the local educational system, particularly during a period when local education is a central matter for public debate, decision-making, and resource allocation, including: the quality and administration of local school systems at a community-wide level; the quality of schools within specific neighborhoods and geographic regions; information about educational opportunities, including school performance assessments, enrichment, tutoring, after-school care and programs; information about school alternatives, including charters; information about adult education, including language courses, job training, and GED programs, as well as local opportunities for higher education.
4. *Transportation Systems:* All members need timely information about local transportation across multiple accessible platforms, including: information about essential transportation services including mass transit at the neighborhood, city, and regional levels; traffic and

road conditions, including those related to weather and closings; timely access to public debate on transportation at all layers of the local community, including roads and mass transit.

5. *Environment and Planning*: Local communities need access to both short and long-term information on the local environment, as well as planning issues that may affect the quality of lives in neighborhoods, cities, and metropolitan regions, including; the quality of local and regional water and air, timely alerts of hazards, and longer term issues of sustainability; the distribution of actual and potential environmental hazards by neighborhood, city region, and metropolitan area, including toxic hazards and brownfields; natural resource development issues that affect the health and quality of life and economic development of local communities; information on access to environmental regions, including activity for restoration of watersheds and habitat, and opportunities for recreation.
6. *Economic Development*: Individuals, neighborhoods, and communities need access to a broad range of economic information, including: employment information and opportunities within the local region; job training and retraining, apprenticeship, and other sources of reskilling and advancement; information on small business opportunities, including startup assistance and capital resources; information on major economic development initiatives affecting all local levels.
7. *Civic Information*: Communities need information about major civic institutions, nonprofit organizations, and associations, including their services, accessibility, and opportunities for participation in: libraries and community-based information services; cultural and arts information; recreational opportunities; nonprofit groups and associations; community-based social services and programs; and religious institutions and programs.
8. *Political Life*: In a federal democracy, citizens need information on local, regional, and county candidates at all units of governance, including: information on elected and voluntary neighborhood councils; school boards; city council and alder elections; city regions; and county elections; timely information on public meetings and issues, including outcomes; information on where and how to register to vote, including requirements for identification and absentee ballots; information on state-level issues where they impact local policy formation and decisions.

1. Emergencies and Public Safety

The need for information on *emergencies and public safety* is clear and incontestable. When local emergencies and potential hazards and disasters are imminent, individuals, neighborhoods, and whole communities need access to information on platforms that are *universally accessible* and in languages understood by the overwhelming majority of the local population. This includes information on dangerous weather; environmental and other bio-hazardous outbreaks; and public safety threats, including terrorism, amber alerts, and other threats to public order and safety. Further, all citizens need access to local (including neighborhood) information on policing and public safety.

Much of the communication literature in this area concerns general risk and the performance of the mass media. Further (as is the case with much communication research in general) it addresses *effects* of communication more than the structural questions of what kind of information is available and toward whom it is targeted. We begin with the literature on how mainstream media over the air (radio and television) meets those needs. We then address new media, and we focus on the needs of diverse communities, including minorities, immigrants, and those with disabilities. Finally, we address information concerning crime and public safety.

Mass Media and Risk

Radio and television are the most comprehensive media for disseminating crisis information in the metropolitan region. A series of studies have assessed whether and how radio (and to a lesser extent television and the Internet) have provided essential information during emergencies, both to general populations and specific groups. A comprehensive assessment of 127 radio stations by Spence et al. (2009) found that during times of crisis, radio stations in smaller markets are better prepared for crisis, more likely to perceive a civic responsibility to cover crisis, and more likely to believe that their coverage had a pro-social effect on citizens. But they also found that many stations do not invest much time in crisis training and preparedness, and instead rely heavily on the Emergency Alert System (EAS). Further, there are significant differences across market size, format, and frequency. Radio stations in larger markets are less likely to have a communications plan in place for emergency. A followup study of the Midwestern Floods of 2008 (Spence et al. 2011) found that while stations in disaster prone areas are more likely to acknowledge responsibilities to the public, they were often reluctant to coordinate with public officials during a disaster while larger market stations were less likely to either be prepared for disaster or acknowledge their responsibility to do so. Authors conclude that larger communities may be "without the information necessary to protect life, health, and property," as well as to reduce individual stress and provide information resources for community rebuilding.

New Media and Crisis Communication

There is a small but growing literature on the role of new media in crisis communication. Consistent with findings by Hindman (2011) much local, web-based emergency information originates from traditional news sources, particularly television stations' websites. In the most comprehensive examination of the volume and scope of public health emergency information on local television websites, Tanner et al (2008) collected and analyzed stories about chemical agents, health pandemics, weather-related disasters and other threats identified by the Center for Disease Control and Prevention. Authors sampled five large, five medium, and five small television markets randomly chosen from the Nielsen-defined designated market areas (DMAs). They found that the vast majority (96%) of websites included in the sample contained some emergency preparedness information. Half of these stories were local. Stations positioned in small markets were more likely to cover health emergency content, while larger market stations focused more on infrastructure issues. The study also finds out that public health information, while generally available, was not always easy to locate within local TV websites. Furthermore, online articles rarely provided more information than what was presented in news broadcasts.

The authors suggest that more resources need to be invested in making local TV websites truly useful for public health emergency preparedness.

Tanner et al. (2009) investigated the presence of mobilizing information (MI), which may cue an individual to action concerning a particular health behavior. Authors found mobilizing information in less than half (44%) of the analyzed stories and found a lack of staff training for covering major public health emergencies.

Together, the literature on the mass media and emergency and the emerging mass media-linked Internet remains sparse. However, it suggests that radio and television remain critical sources of communication in warning of disasters and hazards, but that preparedness by stations is uneven. Smaller market stations appear to take their role as early warning systems more seriously and to have communications plans in place, while larger stations appear less prepared. There is little clear evidence for why this may be the case, but one hypothesis is the concentration of radio oriented towards entertainment genre-formats under common ownership in larger cities, and the accompanying decline of local radio news. Given the continuing dependence of the local news ecology on traditional sources (Hindman, 2011; see below) it is possible that there is an emerging gap in the provision of local and reliable sources of emergency and risk information, particularly under severe conditions in which weather and power disruption threaten continuing communication from multiple media.

Risk Communication and "At Risk" Populations

While it is not clear whether a general gap in meeting emergency information exists, it is evident that during times of emergency, the risks of not receiving adequate information are significant for lower SES communities, minorities, and the disabled. Many of the best studies center around Hurricane Katrina in 2005, but other studies examine the differential effects of information provision during the September 11 attacks.

A series of studies led by Spence, Lachlan and colleagues explore differences in information reception and response post-Katrina. Spence, Lachlan, Burke, and Seeger (2007) examine differences in evacuation, crisis preparation, information-seeking patterns, and media use among the communities of disabled and non-disabled evacuees in the aftermath of Hurricane Katrina. Surveys were collected from 554 Katrina evacuees temporarily relocated in different areas of the United States. Results indicate differences in crisis preparation and evacuation plans, with disabled subpopulations being more likely to prepare emergency supplies but less likely to have an evacuation plan. Differences between the disabled and non-disabled subpopulations also existed in information-seeking habits. Media use was similar between disabled and non-disabled respondents. Spence and Lachlan (2010) surveyed 935 Katrina evacuees relocated in different areas of the United States. Results indicate differences in crisis preparation and information seeking on the basis of race. Results also demonstrate a continued need to create messages encouraging crisis preparation, especially among at-risk subpopulations.

In one of the most rigorous studies of the differential effects of information seeking during Katrina, Taylor-Clark, Viswanath, and Blendon (2010) evaluate the effects of low socioeconomic position (SEP) and social networks among African-American Hurricane Katrina victims on access to and processing of evacuation orders, and abilities to evacuate before the storm hit. Having few social networks, being unemployed, and being of younger age were significantly associated with having not heard evacuation orders and whether victims' perceived having heard clear orders. This study includes an excellent brief review of the literature on communication and information and risk, particularly in relation to underserved communities (pp. 222-23) and concludes that little is known about the relationship between minority and lower SES communities and the capacity to act on information in the context of disasters.

Data from the Taylor-Clark study is from a joint *Washington Post*, Kaiser Family Foundation, and Harvard School of Public Health study conducted two weeks after Katrina in September 2005 with a randomly selected sample of those evacuated to Houston (N=680); the sample was stratified by race to include 91% African Americans victims. The study's first hypothesis, that lower socio-economic position (SEP) would be associated with lower likelihood of hearing and understanding evacuation orders was supported, with the unemployed and those with few or no social networks significantly less likely to have heard. Younger people (18-24) were more likely to say orders were unclear. The second hypothesis, that those of lower SEP and understanding of evacuation orders would have lower risk perceptions, was partially supported, finding that age and home ownership predicted *underestimation* of the storm's effects, compared to renters and those 35-45. Communication variables were not significant. The third hypothesis, that SEP, social networks, and communication access and understanding were related to acting on information was supported, with home ownership, gender, and information access significant predictors of evacuation. In summary, indicators of "wealth" (home ownership, bank account) employment, and social networks were significantly associated with whether evacuation orders were heard (access), were clear (understanding/processing), and acted upon (utilization). Authors conclude that their findings reinforce the importance of social determinants, particularly SEP in reception to disaster communication. Those without work may be more dependent on mass media, while employment increases access to social networks of weak tie information. Exposure to communication messages "seems to play the strongest role in affecting these Hurricane victims' abilities to evacuate before the storm hit" controlling for other variables.

Subervi (2010) finds that during emergencies, government agencies may not be fully prepared to reach non-English-speaking populations via broadcast media. The report focuses on Central Texas. In this region, most Spanish-language broadcast stations do not have a news department. They lack the needed staff, policies and procedures to inform their audiences of emergencies. This may be particularly problematic when an emergency happens during evenings or weekends. At those times, stations do not have the personnel to promptly air emergency related news or alerts. Subervi presents a case study demonstrating the emergency communications problems caused by this lack of broadcast options. As he illustrates, on Sunday, September 4 2011, Central Texas suffered from devastating wildfires. The region most affected by the disaster was Bastrop County, an area with approximately 33% Latino population. On the day of the disaster, regional Spanish-language radio and TV stations reported no news stories about it. Subervi identifies two major problems that caused this news blackout. First, Spanish-language radio stations in the area do not have news department staff and do not produce original reporting. Second, Spanish-language TV stations have news staff, but they do not have news programs on weekends.

Personal Emergencies and First Responders

In times of emergencies, interpersonal networks, mass media, and ethnic media are all key sources of information. Cohen, Ball-Rokeach, Jung, and Kim (2003) find that mainstream media rather than community and ethnic news outlets were of greater importance during a national crisis. More than two-thirds of the respondents surveyed in this study reported that after the September 11 attacks, they were spending an increased amount of time with newspapers, TV, radio, the Internet, or in conversations with other community members. However, interpersonal and media storytelling were also crucial for information dissemination about the attacks. Respondents who spent more time reading newspapers and talking with others also engaged in a broader range of civic activities.

Policing and Crime

Communities have an interest in a fair and accurate representation of crime. Studies of local television news show that crime and violence are disproportionately reported, leading to a "mean world" effect and a perception that communities have higher rates of crime than actually reported, and that minorities are more likely to commit crimes. There is a large communication literature on general effects of violence in media, but less on the concrete reporting of crime in local communities. There is an established relation between television news and fear of crime and minorities in local communities. In a test of television news and local the fear of crime, Romner, Hall-Jamieson, and Aday (2003) based on a national survey, GSS data (1990-94) and a survey of 2,300 Philadelphia residents, found that across a wide spectrum of the population, and independent of local crime rates, local television news viewing is related to increased fear of and concern about crime, offer support for cultivation theory. Chiricos and Eschholz (2002) in a study of local crime news in Orlando, Florida found that relative to the population, African Americans were not overrepresented as crime suspects and Hispanics were slightly. But qualitative analysis showed that African Americans and Hispanics were portrayed more negatively, more likely to appear as suspects than victims or positive role models; and that this pattern was amplified for Hispanics. Callanan (2012) examines the impact of multiple forms of crime-related media across white, Latino, and African American in a state-wide survey in California (N=3,712). Although the study finds a differential impact by media and across racial and ethnic groups, consumption of local television news significantly elevated perceptions of risk and fear of crime for all groups.

In one of the few studies of the use of social media during a short-term, local violent crisis, Heverin & Zach (2010) explore the use of micro-blogging as a communication and information sharing resource in Seattle. The shooting of four police officers and the subsequent 48-hour search for the suspect that took place in the Seattle-Tacoma area of Washington in late November 2009 is used as a case study.

There are few studies of the positive role that media can play in policing. In his definitive study of community policing in Chicago (the CAPS program), Skogan (2006) finds that television was the most likely medium for citizens to hear about CAPS, followed by word of mouth, posters and fliers, with newspapers far down on the list. Older and more educated residents were more likely to have heard about the program through community or city-wide newspapers. However, the most active CAPS residents were *least* likely to have heard about the program on television.

In summary, mass media remain critical information resources during emergencies for all populations, but the forms that emergency information takes vary by scale, media format, and community targeted. Even when general information is provided, it cannot be assumed that all members of local communities are being equally served.

2. Health

There is a vast and growing literature on communication and health. Our goal here is to extract the discussions of the health needs of communities more narrowly. We first offer a brief overview of the levels and modes at which health information is structured and delivered in local communities. We then proceed to questions of minority and low-income health needs, before concluding with a discussion of the role of the Internet.

The health literature on media is primarily focused on the health cognition and beliefs and beliefs of individuals, and the media and communication strategies necessary to induce health behavior or discourage unhealthy practices. In the best recent overview of the health communication literature, Viswanath, Wallington, and Blake (2009) demonstrate that media are essential to shaping both individual beliefs and public and institutional agendas. After outlining the historical context of health and media studies, the authors describe major individual-level theoretical frameworks applicable in the area: social cognitive theory, the theory of reasoned action, the health belief model, the extended parallel process model, and the trans-theoretical model. Theories providing insight into the design of health campaigns are also discussed. Those include approaches such as social marketing, message tailoring, and entertainment education.

In addition to individual-level strategies in health communication, the text covers macro-level theories from the literature produced in media studies and epidemiology. These areas of research emphasize the importance of structural, social and community influences on health behaviors and outcomes. The chapter identifies a number of methodological challenges in health and media studies. The most important one among them is finding a robust way to measure exposure to health messages from competing sources in a crowded media environment. Measuring exposure and its association with health and risk behaviors is crucial when evaluating intervention effectiveness and designing subsequent campaigns.

Viswanath et al. address both the promise and the perils of new media with regard to public health. The Internet may enhance access to tailored health information and services. It may allow medical professionals and community organizers to rapidly distribute and update content. At the same time, online health information can be incomplete, misleading, or fraudulent. Another key barrier identified in the chapter is the differential access to new technologies among various socioeconomic groups, a central concern of this review. The authors discuss communication inequality, and link it to a structural approach to health communication, which is consonant with the problem of determining local community health needs (Viswanath, 2006). They define communication inequality as “the differences among social groups in their ability to generate disseminate and use information at the macro-level and to access, process, and act on information at the individual level.” Among the dimensions of inequality are “a) access to and use of information channels and services, b) attention to and processing of health information, and c) capacity and ability to act on information provided” (p. 320). To address these dimensions, authors proposed the structural influence model of health communication (Viswanath et al, 2007) which argues that health outcomes in individuals are mediated by socio-economic status (SES), neighborhood, and social networks, which, in turn, shape access, information seeking and processing, and capacity to act on information; taken together, these, in turn, may influence health outcomes.

The structural influence model is a useful way of organizing our understanding of local health information needs as well. Individuals and families do not, of course, seek out health information, local or otherwise, in a vacuum. The ability and willingness to seek out health information locally, for example, is triggered by life events (e.g. pregnancy, children, illness), general media consumption, and campaigns (both commercial advertising and public health). For some, needs may be met through individual information seeking on the Internet, which is, increasingly, a scale free source of information (and often misinformation). For others, local health needs may be met via to campaigns encountered in media, through community organizations, or personal networks. An adequate model of local community information needs in health must account for these various levels, and whether, and how, local health information is actually made available. Unfortunately, this is the area where extant literature is most lacking.

Traditional Media

The traditional media, television, newspapers, and radio, remain an irreplaceable, critical avenue for local health information. Dutta-Bergman (2004) studies the role of traditional media, the Internet, and interpersonal communication as resources about health-related issues. The author employs four individual-level indicators of health-orientation: active communication channels (interpersonal discussion, print media, and the Internet) serve as primary resources for health-conscious, health information-seeking individuals interested in prevention and engaged in health-related activities. Passive consumption channels (radio and television) on the other hand are the main source of information for individuals who are not health-oriented. The author suggests that broadcast entertainment is best suited as a platform for preventive campaigns. The Internet, print, and interpersonal networks are better channels for communication with individuals who are already active in the area of personal health. Dutta-Bergman (2005) examines media use, interpersonal discussion, and civic participation as predictors of individual health information-seeking practices. The author suggests that the relationship between those factors and health-related information seeking is mediated by the respondents' level of health consciousness, an index of their intrinsic motivation to maintain good health. Additionally, people's intent to obtain that information is significantly predicted by five communicative activities including interpersonal discussion, community participation, newspaper and magazine consumption, and Internet use. In this study, television viewing did not have an effect on either health consciousness or health information orientation.

Consonant with other work, Dutta-Bergman demonstrates that individuals use different media for different purposes. More active health-information seekers, who also tend to be higher SES, are able and willing to use the Internet. Those who are not health oriented rely on mass media. This suggests that the mass media locally will have a continuing role to play in health education and campaigns, particularly on health issues that may not be covered by national mass media or found on the Internet.

Campaigns and Minorities

In the past decade, a growing body of research has emerged on the effects health campaigns on different ethnic groups. Although much of this work examines the general effects of health campaigns at an aggregated level, it also demonstrates how ecological research might approach the differential effects of health information on neighborhoods and diverse groups.

McNeill, Kreuter, and Subramanian (2006) broadly cover the social dimensions of health communication, including: interpersonal relationships (social support and social networks), social inequalities (socioeconomic position and income inequality, racial discrimination), and neighborhood and community characteristics (social cohesion and social capital, neighborhood factors). The authors suggest that those characteristics should be considered along with individual-level factors in order to understand the drivers behind health-related behavior.

Viswanath, Breen, Meissner, Moser, Hesse, Steele,and Rakowski, W. (2006) demonstrate that many major diseases disproportionally affect certain social groups. Factors like education, occupation, and income are strongly associated with the prevalence and mortality rate of some types of cancer. This article suggests that there is a widening gap in health knowledge among people with different socioeconomic status (SES). This gap provides one explanation of the health disparities and risk behavior differentials between populations. The study uses data from the 2005 Health Information National Trends Survey to examine respondent knowledge levels about two factors linked to cancer: smoking and sun exposure. The authors emphasize the need to take into account SES variations within different racial and ethnic groups. The article suggests that treating all members of a race or ethnicity as a homogeneous population may mask important distinctions. This finding is of particular importance for study design, and will be discussed in section 6 Metrics below.

Clayman, Manganello, and Viswanath (2010) demonstrate that social groups have different information-seeking patterns. Language, race and ethnicity are among the factors that predict individual reliance on media, interpersonal, and online sources. Based on data from the 2005 Health Information National Trends Survey, this study investigates differences in trust and media use among Hispanics with high and low English proficiency. Latino respondents who were comfortable speaking English had higher levels of trust in health information from newspapers, magazines, and the Internet. English-speakers also reported more media exposure, measured in hours per day consuming radio, television, and newspapers. Their levels of Internet use were also much higher: 54% users vs. 14% among those who were not comfortable speaking English. The study findings have important implications for health information dissemination. Authors suggest that reaching Hispanics who are not proficient in English may be difficult for more reasons than just the linguistic barriers. Interventions targeting this group may be less effective because of their low levels of trust in media, as well as the low use of various information channels.

Consonant with these findings, Ginossar and Nelson (2010) find that low-income Hispanics in the U.S. are one social group particularly affected by the digital divide and the online participation gap. Authors suggest that community media maintained by local residents can serve as a platform for relevant information exchange. The paper presents a case study conducted in a metropolitan area with high levels of crime and poverty. The intervention employs *promotoras de salud*: community members previously trained in computer skills and website development, serving as health and technology educators. Initial observations, a literature review, and focus group results suggested that an intervention was needed to serve the residents' information needs related to child mental health services.

Kreuter and Haughton (2006) evaluate different communication strategies aimed at making health messages culturally appropriate for specific social groups. They find that culturally tailored information may be more effective in capturing attention, stimulating information processing, and motivating changes in health behavior. The authors report results from an intervention meant to increase the rate of cancer screening and the intake of fruits and vegetables among low-income African-American women living in St. Louis, Missouri. Study participants were divided into four groups: a control group with no intervention, and three groups which received six issues of a tailored healthcare magazine over 18 months. The follow-up assessment indicated that only the combined cultural and behavioral customization had led to a significant positive behavioral change.

Davis, Uhrig, Rupert, Fraze, Goetz, and Slater (2011) evaluated the impact of a media campaign promoting HIV testing among African American women. African Americans in the U.S. have been disproportionately affected by HIV/AIDS, accounting, in 2006, for 12% of the country's population and half of the diagnosed AIDS cases. The intervention was piloted in Cleveland and Philadelphia in 2006-2007. The health message was disseminated through radio, print publications, billboards, and posters in public transportation. The study confirmed that those modes of distribution did generate an increase in HIV information seeking among target audiences. Radio and total advertising measures were significantly associated with an increase in hotline call volume, controlling for demographic characteristics and geographic factors. The authors highlight the importance of supplemental sources of high-quality health information – in this case a website and a hotline. Given the immediate and potentially short-term effects of campaign ads, it is important that individuals can easily access information that would reinforce the supportive attitudes related to the targeted health behavior.

Viswanath & Kreuter (2007) analyze barriers in the area of e-health, which, if not addressed, may turn existing digital inequalities into deepening disparities in health status. The authors suggest that populations traditionally underserved by the health care system are also likely to have limited access to computers and Internet technologies. In order to avoid restricting the benefits of e-health to more privileged high-resource groups, a series of issues need to be considered by researchers and policymakers. These include identifying specific inequalities in equipment availability and digital literacy, as well as enhancing survey sampling and measurement to better understand those disparities. Health and communication policies should be adjusted to remove the obstacles impeding the effectiveness of health interventions among socioeconomically disadvantaged populations.

Gibbons, Fleisher, Slamon, Bass, Kandadai, & Beck (2011) demonstrate that disparities related to race, ethnicity and socioeconomic status are found in both health care and technology use. This theoretical work builds on existing research to examine the potential of health-related uses of the Internet and Web 2.0 by minority populations. The authors note that while Internet penetration is lower among minorities, use of social networking platforms, particularly through mobile devices, is accepted within those populations. This provides one avenue for addressing health information disparities. The study suggests that health care providers need to identify critical needs among disadvantaged social groups and seek to determine whether Web 2.0 may contribute to addressing them.

Research of the USC Metamorphosis project is among the few studies to specifically examine local health needs. Katz, Ang, & Suro (2012) found that Latinos living in the U.S. have limited access to formal health care resources which contributes to their higher incidence of preventable diseases compared to the general population. Their article examined the association between health-related factors and Latino communication ecologies, defined as the array of interpersonal, mediated and organizational communication options available to individuals to achieve everyday goals. A diverse set of informal health connections – to friends, family, radio, TV, Internet, magazines, churches and community organizations – can potentially lead to better health outcomes. The analysis conducted in the study was based on a nationally representative telephone survey of Latino adults conducted by the Pew Hispanic Center/Robert Wood Johnson Latino Health in 2007. The results demonstrated that informal communication ecologies were important for overall health. Diversified informal health ecologies were associated with health care access (regular doctor visits, uninterrupted health insurance, and regular health care location) and favorable health outcomes (self-ratings of general health, health-related efficacy, and knowledge of diabetes symptoms). Higher social status was found to also have a significant relationship with the diversity of individual communication ecologies.

Matsaganis and Wilkin (2012) investigate determinants of health disparities, focusing on access to health-enhancing resources in residential community environments. Their work explores the role of communication as a social determinant of those disparities. The notion of access to health resources is extended beyond health and medical care services to include access to healthier food options and recreation areas where residents can exercise. The text explores individual consequences of being integrated into a local communication network that includes local and ethnically targeted media, neighbors, and community organizations.

Based on data collected in 2009 from a sample of South Los Angeles residents, the analysis revealed multiple paths of influence of communication on access to health resources. Contrary to expectations, being more integrated into the indigenous communication network had a significant and negative effect on health care access. The more connected residents were to the storytelling network, the more difficult they felt it was for them to access health-enhancing resources. One explanation proposed by the authors was the extensive negative media coverage of the decrease in local health-care resources. Another factor was the critical role of health insurance and health status as predictors of access to health resources. Important to note, being integrated into the local communication network also had positive effects, as it increased residents' sense of collective efficacy.

In order to research the availability of health information services to the broad range of community members, in varying neighborhoods, across SES and language groups, Ball-Rokeach and Wilkin (2009) recommend that practitioners should study geo-ethnic communities in order to understand their specific communication ecologies for health goals. They demonstrate that bilingual gathering and dissemination of information is crucial when attempting to reach new-immigrant and low-SES Hispanic communities. The importance of identifying differences between Internet users and offline populations before conducting a survey on the Web is emphasized. The article also suggests that practitioners need to expand the scope of media they deploy in campaigns or interventions to include geo-ethnic along with mainstream media.

Summary

Taken together, the studies discussed above have strong implications for future research. First, they demonstrate that the well established "knowledge gap" in communication is replicated in health (Tichenor, Donohue, & Olien, 1970; Viswanath & Finnegan, 1996). For those who are more actively oriented toward their own information-seeking regarding health is strongly correlated with higher SES and non-minority status. This higher SES group engages in active health information seeking on the Internet. Those less oriented toward self-care tend to have lower-SES and are more likely to be members of minority groups. This group still depends on the traditional mass media for health information.

Health information itself can be divided into the following areas:

1) Information about specific problems, illnesses, and treatments that can, now, be found on the Internet with varying degrees of completeness and accuracy (although it is important to note that access to information is not equal to the capacity to properly interpret that information and act upon it locally).

2) Information about general health problems that are subject to media campaigns (e.g. HIV prevention, smoking, obesity) which are more effective via general traditional media for lower-income populations, although new means of supplementing those campaigns via the Internet and social media are growing.

3) Information about specific local health problems, e.g. health outbreaks, and specific local health opportunities, e.g. public health services, and vaccination clinics. *This area is virtually untreated in the literature we examined, and one of the most important areas for investigation.*

Even the strongest advocates of a market-based health system would agree that in a local community, citizens need to be informed in a timely manner and understandable language of health outbreaks and opportunities for prevention. But it also seems probable that there would be broad agreement, that members of a community need to understand how they can get treatment in their local areas. This is consonant with national health policy goals, for example to encourage the use of preventative over emergency treatment. Clinics, well-baby care, vaccination programs are all areas in which citizens need information access, and whether this information is being provided in a timely and accessible manner is simply not answered in the existing literature. It is unclear whether it is being provided via mainstream media or the Internet.

3. Education

We systematically searched literature in communication, education, political science, sociology, and economics on education and the information needs of communities, but found a *surprising lack of scholarly literature addressing local educational communication*. The majority of what we did find addressed information seeking by parents about choice- or charter-schools. However a series of policy studies from the Brookings Institution, led by political scientist Darrell West offers insight into the amount and type of coverage of education issues; the issues that local community members want to see covered; and, to a lesser extent, the role of new media in providing local information. We begin with the Brookings studies; next we address the school selection literature; and then briefly discuss additional findings.

Brookings Studies on Education Information

Beginning in December 2009, the Brookings Institutions published three studies on news coverage of education written by Darrell West, Grover Whitehurst, and E.J. Dionne. Taken together, they offer the most comprehensive analysis of community information needs in education. Their reports consisted of some primary research (surveys and brief case studies) and secondary analysis. Although they are a strong overview of the state of education journalism, the studies are only a beginning. The fact that they stand out as they do reflects not only their quality as policy reporting, but the virtual absence of primary academic scholarship in this area. The Bill and Melinda Gates Foundation funded all of the reports.

The first study, "Invisible: 1.4 Percent Coverage for Education is not enough," (December 2009) examines the amount and type of news coverage of education nationally, with some extrapolation to the local domain. The second, "Re-Imagining Education Journalism (May 2010) is primarily an account of the increasing failure of the news ecosystem to adequately report on education nationally and locally, with some suggestions for the formation of a non-profit reporting sector. The third, "Americans Want More Coverage of Teacher Performance and Student Achievement," (March 2011) addresses the amount and type of coverage that Americans want of their schools. [A fourth, "How Blogs, Social Media, and Video Games Improve Education," (April 2012) is not directly relevant here]. The reports are rich in data, most of which we will not attempt to summarize here. We discuss them in order because they build on each other, but stress that we are primarily drawing on those elements most directly related to the local information needs in education. For clarity, we refer to them by short name and date, rather than author.

"Invisible" (2009) argues that because only one-third of Americans have a child in elementary or secondary school, most of what the public knows about schools comes from newspapers, radio, television or the Internet via blogs and social media. Reanalyzing the Pew Research Center's Project for Excellence in Journalism (PEJ) coverage data for 2007 through the first nine months of 2009, the report found that *national* education news coverage was only 1.4 percent of total coverage in 2009, 0.7 in 2008, and 1.0 in 2007. The report also analyzed additional AP coverage for topics, and conducted four short case overviews of leading education blogs and local newspaper coverage in Phoenix, Arizona; Providence, Rhode Island; Des Moines, Iowa; and Minneapolis, Minnesota, chosen for geographic diversity among mid-sized cities. We do not discuss the national findings here, other than to briefly note several findings. The first is the paucity of overall coverage, and of that, the leading topics were school finance and budget, politics, the H1N1 virus or health, and economic stimulus, and general reform. Only 3.4 percent of the total education coverage (i.e. 3.4 of a total 1.4%) focused on curriculum issues, which, as reported in "More Coverage" (2011) is a top concern of Americans. The study found that for national outlets, news organizations' websites are more substantively covering education reform than print or broadcast by the same organizations, suggesting that the web allows for an expansion of topical coverage where resources are invested. We note that the national reporting environment does, of course, impact whether and how well the local communication ecology functions to meet information needs, setting the upper limits of policy reporting.

The most directly relevant section of "Invisible" concerns local news reporting of education issues based on the four city case studies. Authors found significant differences (in qualitative analysis) in how local and national outlets report on education, as well as differences across the four cities. They summarize: "*In general, local papers appear to be more substantive and to devote greater attention to education policy and school reform than do national news organizations*. Local education writers tend to focus less on crime stories or episodic coverage," (p. 18, italics in original) although the politics of education still predominate over teaching and curriculum. Three of the four papers examined had special education sections on their web sites, with at least several reporters assigned to the beat. Authors conclude that the local newspapers and digital blogs (attached to papers) were far more substantive than national coverage, which they see as driven by a judgment that local citizens and parents rely on local media for education news, but also as a "wise business decision." They saw a "possible trend" toward expanded education coverage, although we note that there was too little information to draw such a conclusion. They encourage the development of local quality education blogs and the integration of other forms of citizen journalism into local news coverage of education, which could "help fill the void left by staff cutbacks on education beats."

"Reimagining" (2010) primarily concerns the quantity and content of education journalism generally and at a national level, but argues that the rapid decline of local newspapers will have a disproportionate effect on local educational coverage. The report focuses on the changing media ecology at length, which we will not discuss here. Authors claim, that "the most basic problem is a broad decline in the number of education beat reporters. As news organizations have cut budgets, news rooms have seen their beat reporters responsibilities stretched to general assignment reporting…" (p. 3). The president of the Education Writers association notes that the way newspapers are structured today reporters don't have the time to do in-depth stories. Seminars at Columbia Teachers College to train education beat reporters and editors, that once drew 30-40 people annually, have had to be cancelled. The report suggests the "niche publications" may be taking up some of the slack, but focuses on Washington-based, national newsletters and online publications. These may fill a void in general education policy reporting, but as authors note, cannot serve "the same function as general-purpose newspapers" (p. 5). The report discusses the use of social media and blogs at the local level, for example a Portland, Oregon area consortium of eight schools that use social media to communicate with parents (see Melton 2009). Authors estimate 5,000 blogs in the U.S. devoted to education, but there is no substantiation of this figure, and most of the blogs discuss are professional or academic blogs. There is an extended discussion of nonprofit business models in general, pointing for example to the model of health coverage initiated by the Kaiser Family Foundation, but no evidence that such efforts are actually emerging in education, or that they will have impact on local education information needs.

The third report, "More Coverage," 2011 finds that Americans want more coverage of local schools, including more information about teacher performance, student academic achievement, crime and violence as well as curricula, finance, and reform. This report is based on a national telephone survey conducted in December 2010 with 1,211 adults 18 and over (including an oversampling of parents) in the continental U.S. Respondents were asked about education news consumption, focusing on where they receive information, how they assess it, and how they see the future of education reporting and school communication. Two things stand out from the report. Respondents are clear that they want *more coverage of local schools*, including more information on teacher performance (73%), student academic performance (71%), school crime or violence (69%), school curricula (68%), and school finances and school reform (66%). There was a clear break below this level, with 50% wanting information on scandals or undesirable activities and 42% on school athletics. The other striking result concerns the *sources of information.* The most common source of education news was family and friends (75%), followed by daily newspapers (60%), school publications (56%), local television (54%), and community groups (42%), followed by national television (38%), Internet sites (37%), radio (33%), school specialty publications (28%) and Facebook or MySpace (14%), newsreaders (11%), cellphone texts (9%) and blogs (9%) (p.2).

The results suggest that personal social networks, school publications, and newspapers and TV still play a dominant role in meeting local education information needs. We note that, increasingly, personal social networks are being mediated online; the relevant question asked how much information respondents received from “family members of friends,” and, certainly, some indistinguishable proportion of this is received online. There were predictable age differences in use of media, with those 18-29 years old significantly more likely to rely on electronic news resources and blogs. Surprisingly however, 60% of this cohort said they received a great deal or some information form their daily newspapers, with those 30-49 year old dipping to 53%, lowest among respondents. Non-whites were also more likely to rely on new media sources, with 43% relying on new media compared to 34% for whites, including higher levels for cell phones and news-readers, possibly reflecting the higher rates of mobile adoption among this group. Finally, those earning more than $100,000 were both more likely to get information from a daily newspaper (61%) and from the Internet (51%), suggesting the knowledge gap extends across specific areas of information need (see Health above).

Taken together, then, the Brookings Studies indicate that there is a strong continuing need and desire for local information about education, and that most people rely on personal networks and the mass media as their primary sources. There is a continued desire for accountability news about school performance and safety. Internet and social media sources may meet some part of this demand, but it remains minimal, and there is no good data on how much originally generated accountability news of education is generated in local communities.

School Selection

Beyond general information about local education, there is a growing need for information about choice and charter school. The number of choice- and charter-schools in the United States has been rising steadily. With varying degrees of emphasis, administrations of both parties have argued that choice/charter schools offer a significant pathway to improved education for all children, but particularly lower SES and minority children. For this system of scarce but public goods to function, there need to be robust local systems of information on the range of schools available, their quality, and the steps necessary for parents to enroll their children. Studies from the past decade and a half suggest that this information is either not available, or not evenly distributed.

In a an early, widely cited study of choice, and stratification in networks of information about schools published in the flagship *American Journal of Political Science,* Schneider, Teske, Roch and Marschall (1997) analyzes networks as a strategy of information gathering based on previous research that shows that networks can provide valuable shortcuts to the information necessary to participate in this expanded market for public goods. Critics have argued that choice will heighten existing inequalities based on education, income, and race. In this study the quality of networks in school districts with choice is hypothesized to be higher than in school districts without choice and to increase with parental education levels. Networks also are hypothesized to be segregated by race. Dyadic discussions about education are highly segregated: Blacks speak mostly to Blacks, Hispanics to Hispanics, and Whites to Whites. Income and education effects point to stratification in networks-higher status individuals are embedded in better networks that can act as more efficient sources for information about schools. This way they have less need to rely on formal sources of information, such as newspapers. Hypotheses are supported, suggesting that for higher SES individuals, personal information seeking patterns through networks offer a competitive advantage.

In a follow-up study also in *AJPS*, Schneider, Teske, Marshall and Roch (1998) examine how much information inner-city parents have about schools and demonstrate that, on average, these parents have very little accurate information about objective conditions in the schools. The sample for the study is constituted of parents whose children are enrolled in public elementary schools in two inner-city school districts in Manhattan, New York. The study demonstrates that parents rely on cues provided by others when choosing a school but there is little evidence that the majority of inner-city residents engage in extensive interpersonal communications about schools. Also, not only are their networks limited in size, most of these parents are not linked to high quality sources of information. Patterns of discussion about schools are stratified by class and segregated by race. The authors also found that evaluations of schools appeared infrequently in the media. In their extensive search of newspapers to find stories about schools in the districts that they studied, they found less than a dozen stories in the previous five years and most were about the turmoil in a district's community school board. Television programs are even less likely to carry coverage of the performance of individual elementary schools. The authors argue that just like private sector markets, it is only a subset of involved, motivated, and informed parents that are driving the outcome. These "marginal consumers" are likely to be better educated and less likely to be members of a racial minority.

Hastings and Weinstein (2008) report on two experiments on information, school choice, and academic achievement. They examines a natural experiment and a field experiment that provided direct information on school test scores to lower-income families in a public school choice plan. Receiving information significantly increases the fraction of parents choosing higher-performing schools. Parents with high-scoring alternatives nearby were more likely to choose non-guaranteed schools with higher test scores. The results imply that school choice will most effectively increase academic achievement for disadvantaged students when parents have easy access to test score information and good options from which to choose.

Garcia (2011) reports on the supply side of school information, examining the conflict facing state education officials in reporting the adequate yearly progress results required by No Child Left Behind and how those challenges obfuscated the transmission of school choice information to parents. To comply with school accountability mandates, state education officials transformed test scores into school performance labels using complicated accountability systems. Then, to meet school choice requirements, state education officials were required to explain the results in a way that parents can understand. Article concludes that creating standards for information reporting including accountability and choice are a major challenge.

Tornatzky, Cutler, and Jongho (2002). Investigate the availability of knowledge about college that parents need to help their children make a successful transition between high school and college. The study examines how and to what extent Latino parents have acquired such information, dubbed "college knowledge." Findings are based on a telephone survey of 1,054 Latino parents in Chicago, New York, and Los Angeles and in-depth interviews with 41. Knowledge deficits were significantly more evident among parents with lower incomes and educational levels and among first-generation immigrants. The main sources of information for Latino parents were counselors, teachers, and family and also printed materials and the Internet and they made "heroic attempts" to acquire the necessary information. Both English and Spanish mass media were conspicuously absent as sources of information. Language barriers were an extremely important factor impeding acquisition of college knowledge.

Goldrick-Rab (2010) reports that community colleges, a major avenue for job retraining and advancement, are often disparaged in the local media. Less than 2% of all national media coverage is of community colleges. This article, however, is primarily about structural challenges to community college success.

Local Education in the Community Media Ecology

Finally, one in depth-case study exists of a local education information ecology over several years. Friedland, Long, Shin, and Kim (2007) studied the case of a set local school referenda in Madison, Wisconsin, to model relationships among social networks, public networks, and the local media ecology. Three interlinked referenda held in Madison in Spring 2005 to determine whether to expand a predominantly-minority school, expand the overall operating budget of the school board, and to expand maintenance. All of the referenda were part of an attempt to address a growing achievement gap between minority and non-minority students. An earlier study of school pairing (Kang 2000), also to address the achievement gap, had found four sub-publics in the community: two African-American, two majority white, one of each for school pairing, one against. These issue publics were correlated in the referenda with coverage by two major daily newspapers, to determine how the overall issue was framed, and how framing changed with changes in the trajectory of public debate. The study also included analysis of one of the early and most influential educational blogs, Madison-based School Information Systems.org (SIS), to see whether and how it influenced the local issue debate. Results were that prior to the referenda, the issue publics and newspaper coverage were highly correlated, with the four-fold pairing publics appearing regular as clustered groups in local news. However, SIS formed a significant "counter-public," that was able to rally the support of a highly active minority (around 15%) of the local community, predominantly white and affluent, and connected to local real estate interests, to oppose the referenda. The SIS candidates prevailed. The study demonstrated that, at least in this single case, blogs were a highly effective alternative to mainstream news coverage, particularly for mobilizing an affluent minority. But they did not serve as a neutral, quality alternative to declining newspaper coverage, even though the overall quality of SIS information was very high. Rather, they were a means of propagating a minority point of view and successfully mobilizing support in the local political sphere. The case is only suggestive, of course, but it does show what *might* happen if local, interest-oriented blogs come to replace general interest reporting by newspapers. It also suggests a knowledge-gap effect: those with the economic and skill capacities to mobilize interpersonal networks and create publishing alternatives can define local debates.

Summary

In sum, the literature on information needs in education is scattered. Returning to the core needs, there is evidence of continuing news coverage at a local level of the quality and administration of local school systems community wide, through the mass media, particularly newspapers. But there is also evidence, from the overall media ecology, that suggests that the resources currently being invested in education coverage will not continue with the decline of investment in local newsgathering. There is only scattered evidence that local online alternatives might partially substitute for general interest coverage, and some evidence that it may support specific interest groups rather than general community information needs. Despite the urging of

Brookings for a non-profit education reporting alternative or supplement at the local level, there is little evidence that they exist on a widely distributed scale (although this could be the result of a lack of good data). There is, however, strong evidence, based on Brookings surveys, that Americans want continued strong, general interest coverage of local education.

There is evidence from the school choice and charter literature that neighborhood based assessments of school alternatives are sparse, at best, and difficult to navigate where they do exist. Where parents do receive local information, particularly lower SES parents, there is evidence that it can improve the quality of their choices. But high quality (albeit early) evidence from the 1990s, suggests that existing inequalities are likely to be exacerbated by choice based on interpersonal networks. Sociological research on the distribution of strong and weak ties (Granovetter, 1973) suggests that weak-tie networks, which correlate with higher SES, provide more new and useful information into social networks, while strong ties, or local networks, which correlate with lower SES, tend to replicate existing knowledge. This suggests that given the continuing importance of personal networks as the single strongest medium for circulating school information, that the absence of reliable, navigable, and public information, either in the form of general interest news or quality, visible public portals may reinforce continuing information disadvantages for middle- and lower-SES community members.

We gathered little information about special programs, adult education, language skills, job training, or GEDs. The one proxy for this research, Goldrick-Rab, has relatively little to say about local media.

4. Transportation

To focus on the key question of access to transportation information in local communities, we reviewed literature in urban planning, public policy, and geography, as well as computer science. There is no published scholarly literature (that we could locate) on what we will call the normal or everyday role of providing information on city traffic that is performed daily primarily by local radio and television broadcasters (but also increasingly via mobiles). Here we simply acknowledge auto traffic information is what many Americans seek much of the time in cities of any size, and, further, because it is commercially viable, it is reasonably well provided and used. We focus on other aspects of transportation information, particularly on public transportation systems relied on by many, and information about public debates over transit issues.

Despite the continuing dependence of most Americans on automobiles, not all community members are drivers, and public transportation systems are still crucial for allowing many individuals to find and get to work, and live independently. Young people and lower-income individuals also rely on public transportation, especially for employment opportunities, making information about transit crucial. People with cognitive disabilities are a key demographic group that relies on transit systems with unique information needs. And increasing use of public transportation, along with car-pooling, is a key policy goal in reducing pollution.

Community leaders and decision-makers also need various kinds of transportation information to ensure that transit systems meet the needs of various community groups. This problem is especially pronounced in rural communities, which have to develop systems that cater to individuals spread across sparsely populated geographic space.

Finally, as in other areas discussed, communities learn about transportation issues via public education and outreach campaigns through both mass media and the Internet. Specifically, campaigns related to public transportation use, carpooling, reductions of driving in general, and bicycle use have demonstrated some effects in changing citizen behavior.

Public Transportation Information

The most basic need in public transportation is reliable and accessible information about routes, trips, arrivals, and alternatives. In a multiple city case study conducted for the Community Transportation Association of America, Archer (2012) outlines recommendations for users' public transportation information needs drawing from user tests in four metro areas: YoloBus of Yolo County, California; Johnson City Transit System in Tennessee; Greater Lafayette City Bus in Indiana; and Metro Transit in Oklahoma City, Oklahoma.

The study finds that commuters need real-time information about their trips, from the arrival status of buses to the availability of rideshare alternatives. This information is particularly important for those who work late or need flexible schedules in commuting. Passengers perceive their trip as "better" when they have more up-to-date information, even if the actual wait is longer. Improved information could increase ridership, public satisfaction and willingness to invest in public transit. Seasoned users search for routes that they use daily to get real-time updates on progress. They should also be able to request real-time alerts for common routes and boarding times that update directly to mobile phone or computer without having to search.

Finally, the report concludes that these services are only as effective as the openness of their data structures. Data collected for these endeavors, such as traffic detectors, should be shared with users, not just planners. Allowing creative development of these applications and platforms will enable creativity, better solutions for users and more competitive costs for the service-providers.

Younger riders are more likely to use social networking and mobile devices. Bruffy (2010) describes new developments in a transit system serving 90,000 people in a West Virginia university town. Almost two-thirds of users are under 30 and use social networking, mobile devices and web-based applications to plan and update travel in the region. The study finds that cloud commuters want real-time information and travel updates.

Low-income Users

We uncovered no research on the specific transit information needs of low-income communities. However, studies have demonstrated that Public transit is particularly important for low-income users, who are more likely to depend on it for employment. Blumenberg (2002) examined barriers to employment for welfare recipients in California, finding that transportation access is significantly related to employability. Many individuals receiving welfare live in "job-poor" neighborhoods geographically distant from employment opportunities. Women make up 80 percent of all welfare participants and are more reliant on public transit than men. In contrast, Cervero, Sandoval and Landis (2002) demonstrate that private rather than public transit makes more of a difference in low-income employment outcomes. Car ownership "significantly increased the odds" of welfare recipients finding a job. However, this does not mean public transit wasn't important. Of those without cars, individuals who lived within walking distance of transit stations were better able to find employment than individuals who lived out of walking distance.

In sum, low-income communities are more dependent on public transit in general, and for employment. Reliable information on public transit is a prerequisite to regular use. Its absence imposes additional transaction costs on low-income residents, in longer waits and possible missed opportunities for employment.

Rural Areas

Rural communities have particular problems in planning and coordinating public transportation in general and providing regular user information. Stommes and Brown (2002) report that rural communities have had greater difficulty in part due to lack of information sharing and coordination. Deregulation of transportation, such as the Bus Regulatory Reform Act of 1982, has provided local rural communities with the responsibility of structuring their region's passenger transportation. Intercity bus service in rural areas dropped by half from 1982 to 2000. Intelligent Transportation Systems are federally funded in rural areas to provide weather updates, road condition information, and vehicle location services. They use the technologies to create information solutions to particularly rural problems, like the long distance between destinations, lack of communication and other infrastructure and high per unit cost for providing services.

Many human services agencies pick up the slack by purchasing vehicles and transporting people around a given region. The need this serves is hard to measure because the agencies often classify this expense not under transportation but under client-services. Without this information, communities have a hard time deciding their transportation needs. There is a need for rural decision-makers and community groups to coordinate information, pool financial resources and political capital.

People with Disabilities

Americans with disabilities, particularly lower SES, have unique transportation problems, that also bring unique community information needs. Carmien, Dawe, Fischer, Gorman, Kintsch and Sullivan (2005) report that more than 15 million Americans have cognitive disabilities, including those with developmental disabilities, traumatic brain injuries, stroke effects and Alzheimer's and other mental diseases. For these members of society, who typically do not drive, public transportation is the only viable option for navigating their communities to socialize, run errands or hold a steady job. Transportation functions as a "gateway" for community participation and is often crucial for enabling these individuals to live independently.

However, public transportation systems are among the most complex large-scale systems found in modern society. In order to use public transportation, users must "comprehend, manipulate and process essential navigation artifacts," such as maps, schedules, signs, clocks and other route guides. To interpret this information requires fairly complex cognitive processing. The failure to provide usable information to those with cognitive disabilities pushes this population to use special access vehicles that supplement mainstream transit, which are designed primarily for people with physical disabilities. This is a case where information failure imposes direct increased costs on overstretched public transportation systems.

Carpooling

Many governments and private employers seek to reduce vehicle traffic by encouraging carpooling. In a study of the GoVermont public campaign and ride-sharing database, Watts (2010) found that commuters in Vermont who participated in either a survey or focus group responded positively to incentives to carpool, especially those provided by employers, such as reduction in parking lots, designated carpooling lots and ride-matching services. The study found that inability to find others who were going from one location to another often stood in the way of effective carpooling, with over half of respondents citing that as a reason not to carpool. There is a possibility that real-time information about carpooling matches in the area might help to reduce the need to make arrangements days or weeks in advance for carpooling.

Planning and Information Campaigns

In a comprehensive white paper, O'Connor, Schwartz, Schaad and Boyd (2000) address best practices for collaborating with stakeholders in making transportation decisions, including providing information about transportation policy, process and constraints and gathering information about what sort of stakeholders should be included. Authors suggest that agencies use mass and interpersonal communication tools to provide information and assess public opinion about issues. Limiting public involvement to public meetings, privileges the perspectives of activists and lobbyists. Transportation agencies should gather information both from traditional community organizations and the general public. Information technologies can help reach out to stakeholders who might otherwise be overlooked. Further, new media can convey complex information about policy solutions in a clear way. Public involvement is the product of changing expectations of local communities based on devolution of power in transport and other policy decisions at the local level. Public involvement campaigns are not simply public information campaigns, because they involve collaboration with information going both ways. But informing the public about the issues, process and constraints involved in decision-making is necessary for public involvement to work. Agencies should play key role sin providing information that "help people accurately assess the importance of the issues to their quality of life, and attract and communicate effectively with a broader audience."

Henry and Gordon, C. (2003) examined a joint government- and business-sponsored driving-reduction campaign in Atlanta, Georgia. The campaign aimed to reduce driving in order to reduce harmful emissions, raise awareness of ground-level ozone and air pollution in general, and inform the public of pollutant health consequences. Overall, the authors found that the public information campaign increased social awareness of the problem and significantly fewer miles were driven on days when ozone levels were expected to exceed standards. The authors attribute this to reductions in driving by government employees, who were specifically alerted about ozone levels. The study indicates that public information campaigns can help spread awareness, but actual behavior change comes from employer involvement in incentivizing actions.

Bicycles

In a meta-analysis looked at 139 case studies policies and practices that influenced bike ridership, Pucher, Dill and Handy (January 2010) found that those cases that used public education and marketing campaigns as well as providing necessary information about bicycle access increased the number of bicycle trips and share of people riding. The researchers did extensive secondary research on 14 case studies that used multiple interventions to ascertain their results. Other contributing factors were land-use, integration with existing transit, and legal issues.

We note, again, that public information campaigns to increase desired behavior depend on availabilities in mass media, and that these availabilities are limited and declining in local communities (Gantz et al 2008).

Summary

Community information needs in transit divide broadly into three types: 1) standard information on automobile transportation routes, everyday commuting information, that is generally provided by commercial broadcasting organizations supplemented increasingly on mobile devices; 2) information necessary to adequately use public transportation which disproportionately affects low-income, minority, and disabled communities, but also affects the affirmative public goals of many metropolitan areas of increasing public transit ridership generally; and 3) information planning for public transportation policy, including adequate notice of opportunities for participation to the broadest possible group of stakeholders; and 4) public information campaigns to increase transit ridership, use of single-car commuting alternatives like carpooling, and bicycling. The literature in these areas is inconclusive, largely made up of case studies (although of high quality). They suggest that there are significant information needs, particular in the everyday use of public transportation. Meeting these needs will be a challenge because adequate data and information infrastructure does not exist in most communities, but also because of the adoption gap in mobiles. Beyond data and infrastructure provision, transportation systems will have to find ways to meet the needs of those with non-smart mobiles.

5. Environment and Planning

Basic environmental information on the quality of local air and water is both a fundamental everyday need of individuals and a more general requirement for community engagement with public policy-making. Every information needs include the availability of timely alerts about problems. But there is also the need to have information available in fora that are accessible, and in a form that can be meaningfully interpreted.

In local communities, the distribution of environmental hazards (past, current, and potential) is generally not evenly or randomly distributed. Some neighborhoods and city regions, even some metropolitan areas, are more subject to hazards like toxic waste and brownfields. Here too, communities have the need for timely and interpretable information, in forms that can be applied to smaller geographic subareas. In our review, we found that issues of general quality and the distribution of hazards are often paired, so we have combined them in this review.

More generally, natural resource development issues affect the quality of life in most American communities. Information about existing or proposed development of natural resources, as well as plans for sustainability and conservation needs to be widely available for public discussion and debate.

Community members also need information on access to environmental regions, including civic efforts at sustainability and repair, as well as basic information on recreational opportunities.

Quality of Local, Metropolitan and Regional Resources and Environmental Hazards

Air and Water

Better strategies for interpreting complex technical data related to environmental safety and planning is a crucial need for communities in order for citizens and decision-makers to put such information to use in meaningful ways. For example, federal regulations stipulate that air quality and emissions information must be released to the public. However, minority and low-income neighborhoods continue to suffer from disproportionately high levels of air pollution. Research indicates that emissions have not been curbed in these areas in part because minority and lower-income communities are less equipped to make sense of the data, which curtails collective action initiatives against non-compliant industries.

In a broad study of toxic chemical release data across 45 states, Shapiro (2005) found evidence that current regulations requiring industries to provide information about emissions have, in general, disproportionately benefited non-minority, higher-income, better-educated communities. Information barriers are the key factor, as better-educated communities are able to overcome disadvantages based on ethnicity. Author reports that pounds of and risk from toxic chemical emissions from U.S. manufacturing facilities have fallen in the years since the EPA's 1986 Emergency Planning and Community Right-to-Know Act (EPCRA). However, information barriers remain to obtaining and processing information on local emissions, because accessing such information requires somewhat advanced technical knowledge. Communities must pay the cost of gathering this information to take action against perceived violations against clean air laws. The author found some support for the effectiveness of state information dissemination policies and broader right-to-know programs at the state level in lowering barriers to collective action for affected communities. Such a finding indicates a role for state agencies in providing additional assistance to communities to use and to interpret emissions-based data.

In a case study the risk for air pollution exposure across metropolitan St. Louis, Missouri, Abel (2008) finds that minority and low-income residents were disproportionately closer to industrial pollution sources. The study illustrates that air quality continues to be a challenge for urban communities, especially for minorities and low-income populations. The author argues that information about these kinds of environmental justice disparities can better help advocates and policy-makers develop specific strategies. He also advocates for better "within community" environmental justice efforts that emphasize community member involvement in combating disproportionate pollution.

Cockerill (2003) examined coverage of flooding in the Davenport, Iowa-based *Quad-City Times* and associations between positive and negative coverage and support or lack of support for flood control policies. She found that positive coverage, which characterized flooding as "natural and beneficial" was associated with less support for policy intervention, and negative coverage was associated with stronger support for local policy remedies. The author also showed the sample articles to scientists, who commented that most flood-related news articles lack information about river processes and how human interventions have affected those processes over time, indicating that the public does not have all of the information relevant for deciding to support water-control policies.

Natural Resource Development and Planning

In terms of general community planning initiatives, broad public participation is a frequent challenge. Several initiatives aimed at better engaging citizens with the community planning process exist, and information is a crucial mechanism for this engagement. Information communication technologies (ICTs) have significant potential in this area. In particular, geographic information systems (GIS) and other visualization technologies can help foster dialogues between citizens and community and agency leaders, as well as help keep the public in touch with evolving plans.

General media have played an important role in framing the planning process for citizens and governments. Crow (2010) employed a comparative case study method to look at a contentious water rights issue in Colorado in 1998. Twelve communities attempted to alter water rights laws in order to protect recreational water in their areas. The case became a controversy that spanned the entire state. The study looked at the role of policy entrepreneurs and local media coverage of the case, finding ultimately that experts wielded a higher level of influence than citizens in promoting the policy changes. When citizens acted as policy entrepreneurs, or advocates, the result was more controversy within the community, less positive media coverage and more media coverage early in the case. Media coverage in general did not much influence the debate, as major coverage began once the policy decisions had been made in 10 of the 12 communities. Successful policy change led to local media coverage, not *vice versa*.

According to Crow, the findings indicate that transparency of political debates and local media coverage are not necessarily compatible with expert policy entrepreneurship, which appears to be a common way for initiating policy ideas. The author advocates expanding research to look at digital media sources and other local media sources besides newspapers.

Digital media sources play an increasing role in local environmental information reporting and planning. One major challenge is to improve both the quality and usability of data. Chen, Gangopadhyay, Holden, Karabatis, and McGuire (2007) proposed expanding currently available tools for collecting water quality data to give government officials and the general public more meaningful access to such information. In order to interpret water-quality data, government agencies and water monitoring councils have designed multiple toolsets, including the EPA's STORET database (http://www.epa.gov/storet), the USGS National Hydrography Dataset (http://nhd.usgs.gov/), and the Maryland Water Monitoring Council's (MWMC) Clickable Map (http://cuereims.umbc.edu/website/mwmc/). However, these tools are not integrated nor do they provide meaningful data analysis to help officials make decisions. The authors took elements from each of these tools to create a new comprehensive tool using semantic networks and reported positive progress toward more effective data integration systems for government agencies in order to help officials and citizens make more informed decisions about water quality policies.

Local governments are increasingly using geographic information systems (GIS) for a variety of public administration functions, including transportation and planning. According to the International City/County Management Association, city/county jurisdictions using GIS programs to create maps and display data increased from 63.4 percent to 73.3 percent between 2002 and 2004. However, as Ganaptati (2011) reports, this growth isn't quite as rapid terms of governments putting GIS-generated information online. Example applications of GIS for community planning include evaluating neighborhood relationships, locations of businesses and residences, natural environment sites (such as watersheds, forest areas and floodplains), land use and zoning, parks and recreation, as well as utility services. There is potential for multimedia information to be embedded in the maps along with spatial data. In some contexts, users themselves can add data to the maps, allowing for two-way dialogue between local government agencies and citizens. This sharing capability has the potential to impact agencies in a variety of ways, and the author specifically mentions park management and economic development (by way of urban planning) as examples. Barriers to implementing GIS in public participation initiatives are less technological and more institutional. He calls for more research on projects that do successful enable participation with these technologies.

One such attempt to broaden participation is the California Local Government Commission's web guide, "Participation Tools for Better Community and Land Use Planning Toolkit" (www.lgc.org/freepub/community_design/participation_tools).

Information on Environmental Regions

In addition to environmental safety, outdoor recreation has become a national priority. The U.S. Forest Service has found some information barriers between park managers and visitors, especially minority and non-English speaking visitors. Several chapters in an edited volume by Kruger, Mazza, and Lawrence (2007) address how the U.S. Forest Service outdoor recreation research program can strategize how to meet current the future priorities. Highlight include a call for better information management during forest planning research, such as new strategies for improving use of websites, issue specific research, and the visible documentation of public input and agency responses.

Deborah Chavez in the chapter "Ethnic Diversity and Recreation Preferences" references a study on the Angeles National Forest in southern California, which looked at communication between park visitors and managers. The study found that 45 percent of Latino visitors to the forest spoke only Spanish and determined that sharing information about the forest via mass media was not effective in terms of reaching visitors. In response, park managers initiated a Forest Information Van, which traveled to visitors in different areas of the forest and provided information in Spanish about rules and regulations, as well as information about available activities. Additionally, park managers developed "eco-teams" that hired youths from Los Angeles and trained them to interact with the public in the forest. Team members approaches Latino visitors to tell them about rules related to fires, littering and other topics.

Another chapter by Patricia Winte "Communicating with Recreation Visitors: A Brief Synthesis of Findings" addressed a need for better inter-cultural strategies between visitors and managers. Minorities report a lack of information about recreation opportunities in general. Latinos reported relying on family members as the primary source of recreation information, while Blacks reported church as a significant source. Ethnic media in some communities is also considered an important source for recreational information.

Summary

As in other areas, there is a gap in the literature about citizens' needs for environmental information in everyday contexts. Again, we can infer basic needs: community members need to know whether they air is breathable, whether water is drinkable. They also need to understand whether there are increased toxic risks in their neighborhood or community area. As citizens, they need to know if and when there are public meetings to address environmental issues, and, whether they actively participate or not, they have the need to be informed of outcomes and decisions of public processes. The traditional local media have sometimes fulfilled these needs, but it seems clear that there will be less of this reporting as newspapers decline and continue to cut back on beats, including environmental beats.

Digital tools can possibly fill in some of these gaps, but only if a) the data is readily available; b) it is standardized in a form that can be translated into application program interfaces that can be translated into usable tools and c) standards of interpretation can be developed and taught that are accessible to all communities. The usability and accessibility of such tools is a second level digital divide issue.

Finally, we see throughout the literature environmental information needs that vary by neighborhood, community region, race, and ethnicity. Minority and lower-SES communities are exposed to greater environmental hazards, which makes the need for both broad public information and more specific toolsets able to thematize and visualize risks, and allow citizens in everyday contexts to interpret them imperative. Even in basic recreational opportunities we see differences in information networks, with minorities reporting a lack of general information on recreational opportunities (perceived or actual) and a greater reliance on family and church networks. *This suggests that providing even basic access information to the outdoors requires communication strategies that take diversity into account.*

6. Economic Development

Community information needs related to economic development are broad and varied. As with previous areas, there are large gaps in the literature. There is a large economic and sociological literature on job seeking that we cannot address here. Our focus is on specific information needs of individuals and businesses, and community-wide needs for economic development. Individuals obtain information about the general state of the economy and a community's specific economic initiatives via mass media, which play an important role in setting the agenda for public discourse about the economy, especially in times of economic distress or times of high unemployment. Local media often serve as key sources of information about nonpartisan economic initiatives in a community, such as referenda for publicly subsidized sports stadiums and other facilities. Additionally, media has a role in shaping public perceptions of entrepreneurship and entrepreneurs.

For other economic-related topics, such as job openings, individuals increasingly rely on information communication technologies (ICTs). Such technologies require a certain level of technical proficiency, and the outcomes for individual using ICTs for specific applications, such as job seeking, vary by demographic group. An additional individual-level need with societal-level consequences is information related to paying taxes, and information about tax code processes and enforcement is closely associated with taxpayer compliance.

At the business level, small to medium enterprises (SMEs), rely on ICTs for a variety of day-to-day functions. Yet challenges exist for these businesses both in implementing and maintaining ICTs. A significant need exists for more research about ICT adoption and use in SMEs, as well as programs and services aimed at helping SMEs leverage these technologies. This need is particularly pronounced for rural SMEs, and the literature indicates that SMEs could greatly benefit from improved services or programs that provide customized ICT support.

a) Individuals

Job seeking

Arguably, the most important single economic information need of individuals is job seeking. The most salient factors to this report is the shift from the primacy of the local newspaper want ad section for local job seeking, which began to implode under pressure from the Internet. The rise of Craigslist (an online classified advertisements service) created a free resource for primarily lower income, less-skilled, and occasional jobs, undermining a critical potential new online revenue source for newspapers. Higher skilled and technical jobs listings migrated to national (and transnational) sites like Monster.com. This has arguably led to a bifurcation of the local employment information market in which lower- and some medium-skilled jobs are no longer aggregated in a single accessible and low-cost space (classifieds). They now require Internet access and searching skills to find. Indeed, some research indicates that library computer centers are increasingly important for providing job-seeking help for lower SES individuals, from resume preparation to job searching (Durrance 2005). Those seeking higher-skilled jobs have both the searching skills and the aggregated marketplace to maximize use of the Internet. We do not have good studies of where the search for lower-middle and middle-range jobs has migrated, e.g. service and clerical jobs, lower-level management in local communities.

It seems likely that the Internet has provided a *net gain* in job seeking information advantage, but that early adopter advantage has declined over time. In an early study, based on 1998 data, Fountain (2005) found that job-seekers who used the Internet were more likely to find a position within four months than individuals who did not use the Internet for job searching. Drawing from the Current Population Survey of the U.S. Census, the author found that the early advantages for Internet job searchers has essentially disappeared as Internet use has become more frequent. She argues that in 1998, Internet job seekers were more likely to be white, educated and more aggressive searchers in general--all traits that are likely to yield shorter unemployment durations in general. As Internet use has spread to the broader population, there is no longer an association between Internet job searching and faster success. Fountain's article is valuable for its discussion about the potential for the Internet to enhance weak tie relationships, which have been found to be helpful connections during job searches. She also points out the limitations of the Internet in matching employers and workers; the Internet may have changed the form of the hiring process but has not changed its essential complexity.

In contrast, Kuhn and Mansour (2011) sought to replicate previous work in 2004 that found Internet job searching was associated with *longer durations of unemployment* in 1998 and 2000. Perhaps unsurprisingly, the 2011 study, which looked at 2008 and 2009 data, found that in fact Internet job seeking appears to reduce unemployment durations for younger U.S. job seekers (aged 23-29) by about 25 percent. Authors used data from the Computer and Internet Use Supplement to the Current Population Survey collected by the U.S. Census. This data was paired with information from the National Longitudinal Survey of Youth. The authors found a "huge" increase in Internet job seeking over the last decade. Between 1990 and 2009, the number of young, unemployed workers who searched for jobs tripled from 24 to 74 percent. Unemployed individuals with a bachelor's degree are more than 40 percent more likely to look for work online than high school dropouts. Though earlier studies found that whites were more likely to look for online than Blacks or Hispanics, this study found no evidence of a current racial gap in Internet job searching among unemployed individuals. The study also looked at currently employed workers who searched for a new position online. No evidence was found that these individuals were finding better paying jobs via online searching. Few young job seekers were using the Internet to connect with friends and relatives about job openings, though the authors found those who did use the Internet for this purpose were especially effective in securing jobs. This is consistent with other job-seeking research that emphasizes the key role of social networks in job searching(DiMaggio and Bonikowski (2008)).

Tax Information

Another area of local information seeking is help for preparation of taxes and other government related documents. We found relatively little on this specific function. Uy (2004) finds that for taxpayers who are low-income or have limited English proficiency, the tax code is especially complex.

b) Community Level Economic Initiatives

Beyond the specific information needs of individuals and small businesses, media play a critical role in agenda setting on local economic issues. Although more than 20 years old, Kaniss' (1991) classic study *Making Local News* still contains one of the best account of the shaping of macro-level community policy in the traditional local media system, demonstrating how media interact to create both a policy-making environment, by both setting the local agenda and enabling discussion of it, and a local identity for metropolitan areas that, in fact, consist of disparate communities that vary widely by SES, race, and ethnicity. This has been best illustrated in recent literature in debates over media coverage of local sports stadium initiatives.

Delaney and Eckstein (2008) The examined media coverage of 23 publicly-financed stadium projects in 16 U.S. cities from 1990 to 2004, finding that, typically, local media offer support for such initiatives. Exceptions exists, such as the New York media's skepticism of a new Jets stadium. However, more often, local media look like the *Indianapolis Star*, which mainly "echoed" a pro-stadium government agency report. Such support is in line with local media's tendency to favor community growth coalitions and initiatives. Local growth theory finds that cities typically pursue development strategies that "intensify" land use, increase land values and offer pro-tax policies to corporations. These strategies are often favored over neighborhood-centric policies, such as public safety, transportation and public school funding. Ultimately, then, stadium support in local media editorials and broader coverage is consistent with a news agenda that generally emphasizes local growth initiatives.

Buist and Mason (2010) contend that though scholars repeatedly find that the “intangible benefits” of publicly subsidized sports facilities come nowhere near financially justifying such subsidies, taxpayers continue to approve such initiatives by way of public referenda. The authors cite previous studies that found 20 of 26 (or 77 percent) of subsidy referenda passed between 1990 and 2000. Since these referenda are non-partisan, local newspapers play a key role in educating citizens about the costs and benefits of subsidized sports facilities. This study looked at two Cleveland-based initiatives, one unsuccessful initiative in 1984 and one successful one in 1990. The authors identified four frames for coverage of stadium subsidies in local media outlets. These frames include: (a) economic development, (b) civic status, (c) civic priorities, and (d) financing. Other scholars have noted that elite, growth-oriented “civic actors,” which include corporate leaders, as well as newspaper editors, typically supports large-scale development initiatives and consistent with this, the local Cleveland paper supported both initiatives, despite varying degrees of public and corporate partner support.

The study’s findings provide support for Delaney and Echstein’s finding that news coverage is shifting more toward the “intangible benefits” of sports facilities as reasoning for supporting a referendum. More specifically, in 1984 the newspaper employed an economic development frame. In 1990, however, the newspaper emphasized civic status and financing, and used more “coupled” frames, which blended two of the four frames listed above.

Summary

The literature on local economic information needs across all three levels examined–individuals, small businesses, and community-wide coverage–is patchy and uneven. For individuals, local job seeking is the most critical need. We find some support, although far from conclusive, that the decline of the classified sections of local newspapers have opened up some new opportunities via Craigslist and other national-level online venues, but we hypothesize that this may be leading to a replication of the knowledge gap in job seeking: higher skilled and SES individuals have new advantages in finding both local and non-local employment; lower- and middle-skilled workers find a more fragmented local information market in jobs. The result would be a bifurcated (or possibly trifurcated) local employment information market. We stress that this is only a hypothesis suggested by a yet emerging literature. The literature from library and information science also suggests that local libraries are perhaps the most important centers for bridging this gap.

The literature on local information for small business is even sparser. We have identified a number of clear small business information needs: for technical assistance and planning, financial assistance, and access to information about government and other programs. And, of course, small businesses rely more heavily on the local employment information markets. We cannot draw any conclusions here. However, it does seem clear that small-business remains dependent on robust local information concerning opportunities for assistance and employment markets, so that there is a direct link to small-business success and the local information environment.

Finally, the literature on community-wide economic information tends to focus on the role of the media in agenda setting for large-initiatives. Although we found little literature, it also seems logical that local media play an important agenda-setting role in local discussion and initiatives on taxation and other fiscal matters. The decline of general interest media, with an attendant decline in specialist coverage of key issues like economic development and taxation, is likely to affect broader community capacities for public collaboration and problem-solving.

7. Civic Life

There is voluminous scholarship on the relationship between media use and civic life, largely growing primarily from debates centering around Robert Putnam's series of research on social capital and American civic life (Putnam, 2000). While this literature is more than indirectly relevant to the question at hand, we simply cannot review it here for reasons of time and space. For a recent overviews and discussions of the problem of changing social structure and political and civic communication see Bennett and Iyengar (2008) ; Woolcock (2010); Rojas, Shah, and Friedland (2011).

Here we concentrate civic community information needs. Perhaps the single most important civic institution in this regard is the library, which (while sometimes formally a governmental institution) sits directly at the intersection of civic and community life. In many communities, particularly lower income and some minority communities, the library is *the* most critical civic institution offering access to information.

An important report by Kranich (2004) documented the broad range of critical civic information needs in local communities that were met, in part by libraries. The report, "Opportunity for All," (Becker, et al. 2010) clearly established that libraries remain central civic sources for information access in a digital age, particularly in the areas of health, education, and employment. But beyond the provision of infrastructure, the report documents the critical role in help with finding information and training community members played by librarians, staff, and local volunteers.

The role of libraries in local communities is well documented. A series of studies by Bertot and colleagues (2012) from the University of Maryland Information Policy and Access Center document the essential role of libraries in providing basic information access; 85.7 of public libraries now offer free wireless. However, 76.2% of libraries still report having an insufficient number of workstations some or all of the time. Demand for increased community access via public libraries is a result of several factors:

- More government, education, and employment activities being made available online;
- More people applying for jobs online; and
- More people seeking free sources of entertainment online due to the economic downturn.

Given these demands on access, most public libraries face increases in usage of many Internet-related functions:

- 69.8% of libraries reported increased usage of workstations over the previous year;

• 75.3% reported increased usage of wireless access;

• 49.8% of libraries reported increased usage of electronic resources; and

• 27.6% reported an increased number of requests for training services.

To manage the scope of access demands, many public libraries have established time limits for access to workstations. In meeting all of these community access needs, public libraries face some serious challenges. Budget cutbacks have negatively affected library hours for the past two years. In 2010, 15.9% of all libraries reported decreased hours from the previous year; 31.7% of urban libraries, the most affected, reported decreased hours (see Figure 2). Libraries also face numerous long-term challenges in terms of maintaining and updating workstations and improving community Internet access. In 2010, many public libraries noted challenges in terms of increased cost, limited physical space, limited capacity for outlets and wiring, and limited connectivity speeds.

It seems clear, at least intuitively, that information resources are becoming increasingly central to organizing those aspects of voluntary and civic life that, despite discussions of declining social capital, continue to persist in local communities, ranging from youth sports leagues and recreation, to parent-teacher organizations, to the myriad range of cultural, interest, and social groups in any American community. As women who previously played the central role in organizing and maintaining these activities have entered the workforce (Costa and Kahn 2004), coordination of local voluntary and civic life has moved online. But, although there is, again, a voluminous literature on the *effects* of media on civic orientations (see for example extensive citations to Ball-Rokeach in bibliography; Shah, Kwak, and Holbert, 2001) as yet, we have relatively few good studies of the specific and concrete role that new media affordances play in organizing traditional civic life.

Hampton and colleagues have conducted the most important line of research in this area. Recent research into the role of new communication technologies in local settings suggests that the use of these technologies can lead to the formation of local bonds that encourage civic engagement, deliberation, and broader forms of political participation (Hampton & Wellman 2003; Hampton 2007; Hampton, Sessions, Her, & Rainie 2009; Hampton, Lee, & Her 2011; Hampton 2011).

Hampton (2011) found that use of a subset of Internet technologies – so called social media – in the maintenance of social relationships were found to have a positive relationship to the likelihood of engaging in some civic and civil behaviors. In an observation study of wireless urban spaces, based on observations of over 1,300 Internet users in 7 parks, plazas, and markets in 4 North American cities, and surveys of wireless Internet users at those sites, Hampton et al. (2010) found a positive relationship between the availability of an infrastructure for Internet access and use of public spaces. It was found that Internet use within public spaces affords interactions with existing acquaintances that are more diverse than those associated with mobile phone use Hampton (2007) found that the Internet can have a positive effect on the informal ties that lead to social capital. Based on detailed, longitudinal social network surveys completed by residents of four contrasting neighborhoods for three years as part of a quasi-experimental study, results suggest that with experience using the Internet, the size of local social networks and frequency of email communication with local networks increases. The introduction of a simple neighborhood email list further increases the number of weak neighborhood ties. However, he found continuing potential problems with the digital divide.

In sum, there are critical community civic information needs both for formal access to information infrastructure and training that libraries, among the most central civic institutions, provide. However as lower-income, minority, and non-English speaking communities come increasingly to depend on libraries for access and broadband, it is difficult to maintain the supply. Although more and more local civic activities are being coordinated online, there are very few studies that examine this issue directly. Finally, a series of studies by Hampton and colleagues have demonstrated that online access can help build the weak ties essential to community structure and social capital, but that, here too, digital divide issues can lead to continuing gaps.

8. Political Life

Political information

Information on local and regional political candidates is at the center of local democracy in a federal system. Because U.S. democracy is layered down to relatively small units of governance, it is essential to have a full range of information on both candidates and issues for a functioning local democratic system.

This review focuses on the local level. There is a vast literature on the effects of media on political participation, but there are remarkably few studies of media effects on politics at the local level. These are, for the most part designed to measure the general effects of media exposure of different types on the typical indices of political participation (voting, writing letters to newspapers, canvassing). This review largely bypasses this literature, since it is beyond our scope, and focuses on those studies that specifically discuss local news and governance. We begin with a brief discussion of the actual structure of local government, proceed through only the most basic literature on media and political participation, and then discuss those studies that directly pertain to local community information needs in political life.

Local Government

All politics may not be local in the U.S., but most units of government are. In 2007 (the latest U.S. Census of governments) there were almost 90,000 local governmental units in the U.S. including about 3,000 county governments, almost 20,000 local municipal governments and an additional 50,000 plus special districts., including almost 15,000 school districts (U.S. Census Bureau, 2007). To put this in perspective, in 2000, the average metro area in the U.S. had more than 100 governments, including cities, towns, school districts, special districts, and regional authorities. The St. Louis region has 795 local governments, including 300 cities and township (as of 2002). As a result, ninety-six percent of all elected officials are local (Macedo et al., 2005, pp. 74-75).

The formal information demands alone that this local governance structure presents on citizens are extraordinary. An average American who attempts to monitor local political affairs would need to be aware of candidacies for a county executive, county supervisors, county officers (treasurer, etc.); a mayor and (depending on city organization) up to a dozen candidates for city council; several to a dozen candidates for local school boards; possible candidates for other local and regional district boards; and, depending on the city, candidates for local community and neighborhood boards. Americans are generally uninformed about national elections, candidates and policies, and politics in general (Delli Carpini and Keeter 1996). Michael Schudson (1999) argues that expecting citizens to fully participate in political life is unrealistic. The most we can hope for is the "monitorial citizen," scanning the horizon for only that political information that is most relevant. Relatedly, Zaller (2003) has argued for a burglar alarm theory of the news, which alerts citizens to only the most acute problems (discussed later in this document).

The premise of this review is much simpler: whether to be fully informed or monitorial, or simply to know when a "burglar alarm" has gone off, citizens, at a bare minimum, need at least *some* regular coverage of these units of government and of the officers that run them, both during and after election cycles. If such coverage does not exist, or if it is spotty, episodic, or inaccessible, then the *very possibility* of local political participation is impaired. The opportunity structure for participation depends on the existence of news coverage of local politics and local political issues.

Local news coverage is ecologically organized and reflects the structure of the American metropolis, with its urban core, community areas, widely varying suburban rings, exurbs and rural areas. The organization of government corresponds (albeit very imperfectly, with gaps and overlaps) to this geographic organization. Two media units have traditionally spanned these metro areas: the metro-newspaper circulation area and the DMA. Today, only the DMA embraces complete metropolitan regions, as newspapers (and their coverage) continues to fragment and shrink. Even when newspapers and local television were economically healthier and news coverage was stronger by, in some areas, orders of magnitude, only the politics of the metropolitan core city were regularly covered. Today, television coverage of local politics is (in almost all cases) episodic, and newspaper coverage shrinks annually.

What are the consequences of this decline in coverage? There is surprisingly little research on local coverage of local politics. Early research, from the 80s to early 2000s finds clear relationships between local media use and political participation. In an early and widely cited article, Becker and Dunwoody (1982) argued that research on political effects of communication was overly concerned with national, general elections and that even with the use of interpersonal communication networks, voters primarily learn about local candidates through the media, and that knowledge (not just attitudes) were important predictors of voting in low-involvement elections. Jeffres, Atkin, and Neuendorf (2002) found a positive role for the media in local politics, particularly finding that reliance on neighborhood newspapers and reading of a daily paper predicted both political and civic involvement.

In a major recent study of voting in suburban elections, Oliver and Ha (2007) declare "Despite the importance of local elections in the United States, political scientists have little knowledge of what shapes vote choice in most municipalities and special districts, particularly in the suburbs where a majority of Americans live" (p. 393). They test voting models in 30 suburban communities and find elections dominated by a non-representative but highly-informed group of stakeholders. Although voters in smaller suburbs are more engaged in local politics, and more likely to know candidates, and vote against incumbents, information deficits are exacerbated in suburban places without indigenous news sources on local politics.

In a study of local political news consumption patterns, Shaker (2009) found that women and minorities closed knowledge gaps found at a national level. He notes that it is difficult to generalize the pattern of local political knowledge; this study, conducted in Philadelphia, does conform to early findings in Richmond, VA, Seattle, and Madison WI. More significant is his finding that "media access bears significantly on local citizens' political knowledge" and that "changes in the local media environment have tangible implications for local politics" (p. 820). In a follow up study, Shaker (2011) analyzing the 2007 Philadelphia mayoral campaign, found that there was significant additional content, beyond traditional media, provided by local news blogs, websites, and other sources.

The largest quantitative study of local television coverage of campaigns, by Kaplan, Goldstein, and Hale (2005) examined early and late local news broadcasts between October 4 to November 1, 2004, by 44 network affiliates in 11 U.S. markets, ranging in size from New York and LA to Dayton, OH and Des Moines, accounting for 23 percent of all TV viewers in the U.S. Of 4,333 broadcasts examined, 64 percent contained at least one election story. A typical half-hour contained three minutes and 11 seconds of *all* campaign coverage. Just 8 percent of these broadcasts contained a story about a local candidate, which included campaigns for the U.S. House, state senate, assembly, mayor or city council, judgeships, law enforcement posts, education-related offices, and regional and county offices. Eight times more coverage went to stories about accidental injury and twelve times more to sports and weather, than to all local races combined.

In one of the only qualitative studies of the market failure in public affairs in small communities, Fiona Morgan (2011) in "The Stories Not Told: Understanding the Gap in Local Accountability News Coverage," a Media Policy Initiative paper of the New America Foundation, studied four communities at the periphery of the Raleigh-Durham media market. She conducted an in-depth qualitative study speaking to local stakeholders to identify most important issues in each community. Among her findings, in small communities broadcast and metro news outlets fail to provide consistent coverage of municipal and local affairs. Weekly print newspapers are the main source of local news. Information exchange between stakeholders tends to be informal. Blogs and other digital media news sources are "virtually non-existent" and do not provide significant outlet for news or debate. Media outlets have little interest in online media, but public officials would like to improve their government websites. Official stakeholders complain of a lack of positive coverage, but unofficial stakeholders complain of a lack of viewpoint diversity.

A larger quantitative study of the Los Angeles DMA examines the relationship between local news and voter turnout. Filla and Johnson (2010) report on results of a random-digit dial telephone survey of residents of Los Angeles County (N=2,003) conducted by the Public Policy Institute of California, including a battery of self-reported participation measures. The dependent variable was self-reported voting. Analysis was restricted to registered voters residing outside the city core but within the Los Angeles portion of the DMA (N=813). Respondents were coded into 128 categories, including both cities outside LA and neighborhoods within the city. Each area was then identified as having a daily, weekly, or no newspaper. Authors found a significant relationship between availability of a daily local newspaper and voting in suburban southern California, outside of the city of LA but within the DMA. Regular news about local government outside the city comes almost exclusively from newspapers. Weekly newspaper use was not significant.

Finally, in a test of the effect of local news programming on Hispanic voter turnout, Oberholzer-Gee and Waldfogel (2009) conducted a quasi-experiment of the effect of local news on increased voter turnout in local elections. They found that Spanish-language local television news raised Hispanic turnout by more than 4 percentage points. In markets with Spanish-language news about one quarter of Hispanics tune into these programs. They estimate that news in Spanish caused about a fifth of Spanish-language news viewers to begin voting.

In sum, there is some support for a positive relationship between local news consumption and voting where there is local coverage of local politics at the level of daily suburban newspapers and of the effect of Spanish-language local coverage on turnout. However, the evidence for local coverage of political affairs is scant. Where we have large-scale quantitative research on television, it shows very small, almost trace amounts of local coverage by election.

This is one of the most important areas of exploration for future research. Local elective offices are particular important as an entry point to politics for minority groups (Macedo 2005). Hajnal and Trounstine (2005) in a study of the 10 largest cities and 1,700 additional localities found that lower voting rates in local elections lead to "substantial reductions in the representation of Latinos and Asian Americans on city councils and in the mayor's office." While research remains inconclusive, we can infer that low rates of coverage of local elections have at least an indirect and disproportionate effect on minority political representation.

Summary of Critical Information Needs

We have identified *two broad sets of critical information needs*: (1) those fundamental to individuals in everyday life, and (2) those that affect larger groups and communities. They take different forms across the eight core areas of need that we have identified. Among the most basic are needs for information about the myriad elective offices in even a small American community: without basic information about candidates and their positions Americans do not even have the opportunity for informed participation in democratic life. Similarly, as public policy decisions are made across the range of areas we have discussed, citizens need access to the policy choices that face them, notice about opportunities to participate, and information on decisions that will affect them.

The preceding discussion of eight distinct categories of basic needs suggests that there is an identifiable set of basic information needs that individuals need met to navigate everyday life, and that communities need to have met in order to thrive. While fundamental in nature, these needs are not static but rather subject to redefinition by changing technologies, economic status and demographic shifts. Low-income and some minority or marginalized communities within metropolitan and rural areas and areas that are "lower-information" areas are likely to be systematically disadvantaged in both personal and community opportunities when information needs lag or go unmet. Finally, it is important to recognize that information goods are public goods; the failure to provide them is, in part, a market failure. But carefully crafted public policy can in fact address gaps in information goods provision.

2. *Differentiation Across Demographic Groups and Platforms Ownership and/or Staff*

America is changing so rapidly that it challenges our very definitions of diversity. Our traditional understandings are organized around the concepts of majorities and minorities and as long as significant barriers continue to exist to full participation in society, including the meeting of information needs of communities and groups, we will need to continue to identify and overcome these barriers. But we are moving toward an America of pluralities. By 2042 there will be no single majority group. Moreover, within every population group or community there exists considerable variation across socio-economic status, origin, religious and other beliefs and interests. In this report, we focus on the present –the specific, varied needs of groups in communities and the barriers to meeting them– but also the future, the information needs of the plural America that we are becoming. These changes pose immediate analytic challenges for policy makers and regulators.

Neither information needs nor the way that they are met are distributed equally across communities. Literature from demography in sociology and policy studies shows that American communities vary widely by size (metropolitan [367], micropolitan [576], or rural); racial and ethnic composition; percentage of immigrants; rates of population growth or loss; density; and income distribution. The overall composition of a given community across these dimensions is a significant determinant of both its overall pattern of community information needs and of the degree to which these needs are likely to be met. *We identify two major axes of differentiation: within and between communities*.

For the purposes of this study, we define communities primarily in geo-spatial and demographic terms but recognize that communities also represent common sets of identity, cultures, and beliefs that contribute to significant variations within and across communities. Such in-group variations must be taken into account in assessing and responding to critical information needs.

One important dimension of the differentiation of community information needs and how they are met relates to the media ownership structures within local media ecosystems. A fairly substantial body of research has developed that examines the ownership of media outlets within local media systems, under the presumption that different segments of a community have a greater likelihood of having their critical information needs met if their community is served by media outlets that are owned and operated by individuals with similar demographic characteristics and backgrounds. The sections that follow delve more deeply into the research that examines these presumed relationships (Section 4) as well as into the barriers that inhibit certain demographic groups from fully participating in the ownership and operation of significant media and communications outlets (Section 5) The focus here is on outlining the patterns that currently exist in terms of media ownership across different demographic groups.

In this regard, it is important to emphasize at the outset that the process of assessing media ownership and employment across different population groupings has been fraught with challenges. These challenges have arisen largely from the adequacy of the established mechanisms for gathering, organizing, and reporting the relevant data. As one study commissioned by the FCC concluded, “The data currently being collected by the FCC is extremely crude and subject to a large enough degree of measurement error to render it essentially useless for any serious analysis” (Beresteanu & Ellickson, 2007, pp. 2-3). There has, however, been much effort to improve the information infrastructure that informs policymakers' understanding of the state of media ownership across different population segments (see, e.g., Federal Communications Commission, 2009).

It is useful to begin the discussion of this body of literature with a baseline understanding of the current population ethnic diversity in the U.S. We do so primarily because the majority of literature tends to focus on this aspect of diversity but also stress that such a view of population differentiation does *not* capture the full range of variations across and within communities in the United States, such as religious identification, sexual orientation, national origin and socio-economic or generational status of immigrants, different abilities or disabilities, among others. Demographic changes are challenging the basic definitions of ethnic minorities with the increased prevalence of inter-racial or multi-ethnic populations.

According to the most recent U.S. Census data, the U.S. population composition is follows: 13 percent Black, 13 percent Latino, four percent, Asian and Pacific Islander, one percent American Indian, and 69 percent non-Hispanic white. However, as Wilson and Costana-Chock (2011) note, non-Hispanic whites own over 90 percent of businesses in most categories, including within the media and information industries

More granular data associated with different media sectors further illustrate this pattern. According to recent Census data, 93.5% of newspaper owners are White, 3.2% Asian, 2.4% Black, 1.6% Hispanic, and 1% American Indian (Beresteanu & Ellickson, 2007). According to these data, women own approximately 20 percent of newspapers. A study commissioned by the FCC examined ownership data from 2002-2005. The authors found that, in 2005, minorities owned 379 out of 14,015 radio stations and 17 out of 1,778 television stations. Based on these numbers, people of color owned less than 3% of radio and less than 1% of TV broadcast licenses (Beresteanu & Ellickson, 2007). Subsequent research sought to address possible inaccuracies and gaps in the data utilized by the FCC (Turner, 2007; Turner & Cooper, 2007). This reassessment produced somewhat different results, concluding that people of color own approximately 8% of radio stations and roughly 3% of television stations (Turner, 2007; Turner & Cooper, 2007). In terms of female ownership, the best available data suggest that women own six percent of all full power commercial radio stations and five percent of television stations (Turner, 2007; Turner & Cooper, 2007).

Data are also available regarding minority control over public broadcasting outlets. The Corporation for Public Broadcasting (CPB, 2007) designates a station as "minority-controlled" if at least 50% of its full-time employees and 50 percent of its governing board are members of minority racial or ethnic groups. In 2008, public radio had 71 minority controlled stations: 29 African American, 28 Native American, 10 Hispanic, and 4 Multicultural, out of approximately 700 public radio stations. This means that roughly ten percent of public radio stations were minority controlled. This proportion is certainly in improvement over the state of affairs in the commercial sector; however it remains far less than demographic parity. Public television has just six minority controlled stations (1 African American, 1 Hispanic, 1 Asian Pacific Islander, and 3 Multicultural) out of a total of 356, or about 1.7% (Wilson & Costanza-Chock, 2011).

One of the key questions revolving around the ultimate role that the Internet will play in the contemporary media ecosystem is will it help to correct – or will it merely perpetuate – the inequalities that have historically characterized ownership of components of the media ecosystem? There has been relatively little research that has directly addressed this issue to date. And, of course, given the highly fragmented and fluid state of the online realm, many of the data gathering challenges that characterized the analysis of the traditional media sectors are likely to be exacerbated in the online space. The little we do know at this point comes from the U.S. Census Bureau, which, as Wilson and Costanza-Chock (2011) report, found that people of color owned 1,243 out of 12,158 (about10.2%) of firms categorized as “Internet publishing and broadcasting” operations. As the authors further note, the vast majority of these minority-owned businesses were single person businesses (Wilson & Costanza-Chock, 2011). Of the 1,770 internet publishing and broadcasting firms reporting employees, Whites owned 1,369 while people of color owned 125 (approximately 7 percent; see Wilson & Costanza-Chock, 2011). Census data also indicate that Whites owned 39,160 out of 46,859 (approximately 84 percent) of firms categorized as “Internet service providers, web search portals, and data processing services” (Wilson & Costanza-Chock, 2011).

These data provide an indication that minority and female media ownership varies significantly across platforms. Perhaps more important, however, is that these ownership statistics indicate significant disparities between women and minorities’ representation in the population as a whole and their representation within the population of owners of significant media and information outlets and platforms.

Summary of Community Differentiation

Within a given metropolitan or rural region, low-income, minority (defined not only in racial or ethnic terms), and non-English speaking communities continue to be disadvantaged in the meeting of community information needs, although, we stress, existing research makes it difficult to demonstrate precise patterns of disadvantage and how they vary within and across communities.

The literature does seem to suggest that minority and low-income communities, and non-English speakers, some disabled citizens have *reduced access to basic information infrastructure:* lower-rates of home computer ownership, reduced access to broadband and lower speed broadband, greater reliance on mobile phones but lower rates of smart-phone use. Computer use in libraries is critical in low-income communities, but there is evidence from nationwide surveys in library science that libraries in low-income communities lag in quality of facilities and broadband. Minority and low-income communities and non-English speakers continue to have f*ewer opportunities for learning advanced computer skills*, even while these skills are growing in importance job-seeking, health information, information on local schools, and other basic everyday needs.

There is evidence of fewer “meso-level” media, hyperlocal news websites, information blogs, and online sources of neighborhood news in low-income communities. although the evidence is not yet systematic. As newspapers continue to reduce reporting resources, neighborhood reporting is among the first areas to be cut, and low-income neighborhoods, seen as non-subscribers are cut first. Although much has been made about the ability of new media to fill the gap left by the decline of traditional reporting, it seems likely that there will be significant gaps, or even “news deserts” in some low-income communities. This may be partly offset in some non-English speaking neighborhoods, although there is no robust evidence that non-English news fills the local news gap.

As low-income communities become information islands, partly cut off from both surrounding neighborhoods and the larger community information system, this can have systematic consequences for larger resource system. Harvard Social Sciences professor Robert Sampson, in a major study of Chicago (2012) has shown that negative *perceptions* of a neighborhood are stronger predictors of long term poverty than actual poverty indices.

Community information needs are met by a mixture of private and public goods. But lower-income communities are particularly dependent on informational public goods, which are systematically under produced. Limited case evidence demonstrates that where communities have systematically invested in the information needs of low-income communities, as in Seattle, gaps can be at least partially bridged (Friedland 2013).

We have argued that economic and social differentiation within communities yields differences in the information needs of sub-populations. But, in a nation as varied as the U.S. there are differences in information needs and how they are met *across* geographic or metropolitan areas as well. Increasingly, in an information society, those communities that thrive are those with a highly educated population and superior access to both information infrastructure and more developed local news ecologies. Metropolitan typologies (which include rural communities) developed in the past several years, ranging from the Brookings Institution (2012) to those of James Gimpel in Patchwork Nation (2004, 2010), while not agreeing completely on community typologies derived from factor analysis, demonstrate that there is an ordering of communities in the U.S. with information status operating as one of the most significant independent variables predicting economic growth. Those that thrive score high on multiple indicators of information access and robustness; those that struggle are low.

Thus information inequalities within communities can have both short and medium term consequences for individuals' access to basic opportunities, and potential long-term consequences for community development. While causality is difficult to determine, many scholars argue that ready access to high-quality actionable information is an important determinant of economic and societal outcomes.

III. The Media Ecosystem and Critical Information Needs

3. *Relevant News and Information Across Media Platforms*

Relevant News and Information

The previous sections have addressed definitional issues surrounding critical information needs, as well as the issue of how these needs can differ across demographic and geographic groupings. This section reviews the literature that has engaged in assessments of if and how various components of the local media ecosystem have addressed communities' critical information needs. It is important to note at the outset that research that has taken a genuinely integrated, systemic analytical approach to local media is fairly limited. Consequently, this section also takes into consideration literature that has assessed the structure and/or performance of individual platforms and/or institutions under the assumption that such analyses are relevant, in combination, to developing an understanding of broader local media ecosystems, and to the formulation of future research strategies for assessing these ecosystems.

It is also important to emphasize that some of the issues discussed here overlap with issues covered in much greater detail in the FCC's comprehensive *Information Needs of Communities* report (Waldman, et al., 2011). Thus, the goal here is not to provide an extensive overview of the issues confronting different media sectors, and the current state of these sectors, but rather to highlight research that has assessed how one or more media sectors perform in serving communities' critical information needs.

It is first important to highlight the findings of the limited amount of research that has attempted to take a comprehensive, integrated approach to assessing how different media serve communities' critical information. needs A recent example is a study by Baldwin, et al. (2010), which focused on the provision of city government reporting across print, television, radio, and the Web. In addition to documenting how the different platforms differed in terms of the proportion of their "news holes" devoted to different subject areas, this study also (importantly) found that the bulk of the *original* reporting emanated primarily from daily and weekly newspapers (Baldwin, et al., 2010). Such distinctions between original reporting and the mere recirculation of news and information generated elsewhere are vital to assessing the extent to which different media platforms and outlets are serving communities' critical information needs.

Such findings were also central to one of the most comprehensive efforts to date to assess the contributions of different media platforms and outlets to the critical information needs of a community – the widely discussed "How News Happens" study conducted by the Project for Excellence in Journalism (2010). This study involved the detailed analysis of the news ecosystem of a single U.S. city (Baltimore). Among the study's major findings were that: a) eight out of 10 news stories were simply repeats or repackaging's of previously-published information; b) 95% of all stories containing new information originated from traditional media (primarily newspapers; secondarily, television); c) newspapers are publishing roughly one third fewer stories in a given week than they did a decade ago; and d) new media platforms such as blogs and Twitter serve primarily as an "alert system" to direct audiences to the original sources. These findings are important in that they provide insights into the extent to which different media are contributing the type of original reporting that is fundamental to the fulfillment of communities' critical information needs; as well as insights into the other types of functionalities (e.g., serving as an "alert system") that individual media ecosystem components can provide.

Schaffer (2010) conducted a similar (though less comprehensive) analysis of the city of Philadelphia's news ecosystem. Her study found that: "The available news about Philadelphia public affairs issues has dramatically diminished over the last three years by many measures: news hole, air time, story count, key word measurements" (p. 3). This study, however, did not engage in the assessment of the flow of news across platforms, as did the PEJ study. But together, these studies raise the fundamental question of whether contemporary news ecosystems, for all of their apparent diversity, choice, and lower barriers to entry, are serving communities' critical information needs as effectively as were the less-fragmented news ecosystems of the pre-Internet era.

Other studies have examined the performance of local news ecosystems within the context of very specific subject areas. Thus, for instance, the Kaiser Family Foundation recently commissioned a study, based on interviews and a comprehensive review of the relevant literature, on the state of health news reporting across local print, broadcast, and online news outlets (Schwitzer, 2009). The results indicated that traditional news platforms (such as television stations and newspapers) provide consistently higher levels of health news coverage than newer news platforms (such as the Internet and cable television). Given the ongoing declines being endured by traditional media platforms (see Waldman, 2011), the Kaiser report concludes with concerns about whether the ongoing transition in local media ecosystems may lead to a substantial reduction in health news coverage (Schwitzer, 2009). Research by the Brookings Institution on the state of education journalism reached somewhat more positive conclusions, (West, Whitehurst & Dionne, 2010), though this research was less focused on the state of education coverage across platforms at the local level (this research is discussed in greater detail in Section 1).

Newspapers in the Contemporary Media Ecosystem

Newspapers have historically served as the cornerstone of critical news and information in local communities. Newspapers in the U.S. can be thought of as a distinctive media ecosystem in their own right. One of the more useful approaches to understanding newspapers as a (self-contained) ecosystem is Rosse's "umbrella model," which outlined three levels of newspaper coverage and circulation (Rosse & Dertouzos, 1978). Under this model, large metropolitan papers cover a large geographic region (in terms of both circulation and, to some extent, news coverage). Operating within the large umbrella of such large metropolitan papers are a number of smaller suburban regional papers. These papers circulate within their smaller regions, and provide coverage that focuses on these regions. And then within the circulation/coverage umbrella of each of these suburban regional papers are multiple local community papers, with very geographically limited circulations and coverage that focuses on the local community. Under this model, each newspaper has a dedicated geographic market, with relatively little competition within or across geographic markets.

Some researchers, however, have suggested that the contemporary media ecosystem has caused newspapers to evolve away from the umbrella model. Bridges, Litman, and Bridges (2002) suggest a "ring" model that better accounts for "the ability of each newspaper to compete differently at any level in its broad geographic market" (p. 17). Given the time period in which this study was conducted, the authors do not explicitly address the role of the Internet in facilitating this transition; though they do note that "Expanding technology may eventually remove the landlocked constraints on news providers" (Bridges, et al., 2002, p. 17). This is of course exactly what has taken place, as the elimination of meaningful distribution costs/barriers facilitated by the Internet has allowed for greater permeability across market barriers.

Of course, the Internet ended up having a profound effect on the state of the newspaper industry in the U.S. The current plight of the newspaper industry has been well-documented and has been the subject of an extensive amount of analysis in regards to if and how the business can survive in an era of online distribution and user generated content (e.g., Downie & Schudson, 2009). As the Federal Communications Commission noted in its 2011 report, the digital transition for the newspaper industry has been one in which "each print dollar is replaced by four digital pennies" (Waldman, 2011, p. 39). The bottom line is that newspapers remain unable to adequately replace the revenues lost as the print model erodes with commensurate revenue gains as these publications develop their online platforms and services (Project for Excellence in Journalism, 2012).

The key issue to recognize is that, the reason the newspaper industry is the subject of so much continued attention and concern (despite being the primary (direct) source of news for an ever-shrinking proportion of the population) is that research indicates that newspapers continue to provide a substantial proportion of the original reporting – the original "production" of news – that then circulates through the rest of the local media ecosystem (see above).

However, no components of a contemporary media ecosystem operate in isolation. There are a wide range of effects that one component can have on another, whether it be in terms of content flows or competitive responses. Thus, for instance, research by St. Cyr, Carpenter, and Lacy (2010) finds that perceptions among city hall reporters at print newspapers of the quality of the competition provided by online news sources were positively related to the number of city government stories that these reporters produced. This, the perception of greater online competition appears to compel print journalists to be more productive in their efforts to serve their communities' critical information needs. However, such findings are the exception to a growing body of evidence that the growth of the Internet as an alternate information source has led to systematic declines in various areas of news coverage on the part of local papers (see Waldman, et al., 2011). A study by Daniels (2006) comparing Native American print and online newspaper content found that print outlets maintained a more local orientation in their reporting; whereas online outlets tended to adopt a less local orientation in an effort to take advantage of the absence of geographic limitations associated with online distribution;. However, the study did raise concerns about both types of outlets relying quite heavily on wire services, and how that might affect the extent to which the distinctive information needs of Native American communities would be served.

There has also been a substantial body of research that has assessed the extent to which newspapers serve the various critical information needs of local communities. Caburnay, et al. (2008), for instance, examined the performance of Black newspapers in the provision of cancer information and compared this performance to that of general audience newspapers. The results indicated that Black newspapers devoted a greater proportion of their health coverage to cancer stories, and that these stories were more likely to contain localized information and to refer readers to cancer information resources. The local provision of health information was also the focus of a recent study by Johnson, Sionean, and Scott (2011), which examined local newspaper coverage surrounding the FDA approval of a vaccine for human papillomavirus vaccine. Although this study did not seek to determine whether the overall quantity of coverage that was provided was adequate, it did seek to examine the quality of the information that was provided. According to the authors, the study's most significant finding was that less than half of the articles analyzed provided detailed health information (Johnson, Sionean, & Scott (2011).

Other research in this vein has focused on areas such as political news and information; though much of this research has sought to find structural explanations for the variation in the quantity and quality of political news and information provided by local newspapers; and has been less concerned with determining the extent to which these outlets are effectively serving their communities' critical information needs in this area (see, e.g., Schaffner & Sellers, 2003). One example of a more generalized assessment can be found in Coulson, St. Cyr, and Lacy's (2000) study of city hall reporters' perceptions of coverage of local government. Drawing upon survey data, the authors found that these reporters generally expressed high levels of satisfaction with both the quantity and quality of newspapers' city hall coverage.

It is more common, however, for the research addressing these issues to be quite critical of the extent to which local newspapers are effectively serving communities' critical information needs – particularly in relation to political/public affairs coverage. In a thorough review of this literature, Zaller (2003) points out that the common conclusion within the academic literature is consistently critical of the extent to which local newspapers effectively serve the critical information needs of their communities. He argues, however, that much of this research is employing a standard that is both unrealistic and unnecessary. He thus proposes the adoption of a "burglar alarm" standard. According to this standard, "news should provide information in the manner of attention-catching ‘burglar alarms’ about acute problems, rather than ‘police patrols’ over vast areas that pose no immediate problems” (Zaller, 2003, p. 110).

Local Television in the Local Media Ecosystem

In large part because local broadcast television operates under a government-granted license that includes an obligation to serve the public interest, convenience, and necessity, a substantial amount of literature has developed examining if and how television broadcasters meet their public interest obligations A large proportion of this research has focused on the provision of local news and public affairs content as key metrics for assessing broadcaster performance (see, e.g., Napoli, 2000; 2004; Napoli & Yan, 2007; Spavins, et al., 2002; Yan & Park, 2009). This focus has emanated from the FCC’s frequent emphasis on the availability of local news and public affairs as key criteria in their analysis of local media markets – even though government-mandated news and public affairs programming requirements have all largely been eliminated from the process of FCC oversight over broadcast licensees.

Research in this vein has also drilled down into the nature of local news content, in an effort to more rigorously assess the extent to which the critical information needs of local communities were being met. So, for instance, research has examined the quantity of coverage of local and regional political campaigns (see, e.g., Fowler, Goldstein, Hale, & Kaplan, 2007; Kaplan & Hale, 2000, 2001; Kaplan, Goldstein, & Hale, 2005), with much of this research concluding that the proportion of the television “news hole” devoted to political campaign coverage is inadequate. Other studies have looked specifically at the extent to which local news addresses genuinely local issues, reflecting the assumption that local communities need news and information that is specifically dedicated to the issues and concerns that characterize their immediate community (Alexander & Brown, 2004; Scott, et al., 2008; Yanich, 2010). Wang and Gantz (2007, 2010) have specifically examined the extent to which local television stations provide health news. The results of their most recent (2010) study indicate that one in 12 local television news stories is health-related; proportion that is comparable to the one in ten finding in their 2007 research. The authors also sought to assess the subject matter of these stories against current health trends – finding, for instance, relatively few stories about aging-related issues despite the growing proportion of elderly residents in many communities across the U.S. (Wang and Gantz, 2010).

Within this diverse literature, perhaps the most common theme is that local television stations devote inadequate air time and resources to serving the critical information needs of local communities (see, e.g., Singleton & Rockwell, 2003), a conclusion that raises concerns, particularly in light of the fact that local television news continues to be identified as the most relied-upon source of local news and information. Of course, such evaluative determinations typically are made absent any meaningful baseline as to what constitutes an adequate or appropriate level of broadcaster commitment to serving communities’ critical information needs. Across a number of dimensions, it is possible to conclude that the time and resources that local stations are devoting to serving the critical information needs of local communities are on the decline (see, e.g., Napoli, in press-b); however, such patterns need to be considered within the larger context of the evolution of local media ecosystems, the emergence of alternative information sources, and the ways in which different participants in a media ecosystem will alter their content outputs in response to the behaviors other participants in the ecosystem (see, e.g., Kurpius, 2000; Napoli, 2004).

Like local newspapers, local commercial broadcasters are feeling substantial economic pressures as local media ecosystems reconfigure themselves. Amongst the most recent responses to these economic pressures have been initiatives such as “shared service agreements,” in which two or more local broadcasters co-finance, and share the output of, a single local news operation. Such initiatives are intended to produce economic efficiencies that enable the continued provision of news and information to local communities. Critics, however, have characterized these agreements as efforts to essentially circumvent local broadcast ownership limits (Stearns & Wright, 2011). These arrangements have recently become a focal point of systematic research, with the results showing, perhaps not surprisingly, an increasing homogenization of news content across stations that engage in such shared service agreements (Yanich, 2011).

Local cable television has received substantially less analytical attention than broadcast television; both because cable programmers do not operate under even the general public service obligation that broadcast licensees operate under; and because local cable has only recently emerged as a significant provider of local news and information; and even then only in the larger U.S. television markets. Prior to the emergence of these large market (or state-level) cable news operations, cable’s most substantial contribution to the critical information needs of local communities has been in the form of public, educational, and government (PEG) channels that have been mandated by local cable franchising authorities. And while the literature on PEG channels has been substantial, only a small proportion of this literature has involved meaningful assessments of the extent to which these outlets have effectively served the critical information needs of local communities.

In a case study of a public access cable channel in Manhattan, Howley (2005) concluded that the channel “developed a culture that reflected the interests of a relatively small minority of Manhattan residents; the voices, opinions and perspectives most often unseen and unheard in mainstream television were once again marginalized, this time by a nominally community-oriented medium” (p. 133). From this perspective, public access cable was seen as failing to truly diversify the range of content available in the community; and thus the range of critical community information needs being addressed. Similar critiques have characterized other case studies of community media facilities (see, e.g., Charbonneau, 2009).

Other studies have reached more positive conclusions. Stein’s (1998) case studies of seven different public access cable stations around the U.S. concluded that public access cable provides “a range of democratic speech which is largely absent from professional media industries” (p. 21). It should be noted that all of these assessments are derived from case studies, and that more systematic assessments of public access cable’s content have been lacking. Similarly, Steiner’s (2005) study of a feminist organization’s public affairs series’ airing on public access cable stations around the country led her to conclude that “public access cable television does provide viable opportunities for feminist ‘content,’ for activist-minded news, discussion, and criticism of the economy sphere, the state, and family” (p. 313); and in this way served the distinctive critical information needs of a specific segment of the community.

Local Radio in the Local Media Ecosystem

Local commercial radio has undergone a significant transformation in the past decade, playing – according to many accounts -- a decreasing role in the provision of original community news and information (Waldman, et al., 2011). This is reflected in both declines in the number of “all news” stations in operation in local markets around the U.S., as well as in overall declines in the number of radio journalists employed across the U.S. (Waldman, et al., 2011).

One of the primary concerns that has arisen in recent years in relation to local commercial radio’s contribution to serving the critical information needs of local communities has been the increasing prominence of what has been termed “outsourced news” (see Hood, 2007). These are instances in which the local news that a radio station airs is produced by another radio station outside of the market. Radio news has thus been characterized as operating under a “hub and spoke” model, in which news and information produced by a larger market station is distributed to stations that serve the surrounding local communities for further dissemination (Hood, 2010). In a comparative content analysis of locally-delivered and remotely-delivered news within a single Midwestern community, Hood (2010) found, not surprisingly, that locally-delivered news stories were more likely to address events and issues arising from within the geographic confines of the local community; suggesting that the location of the news operation plays a significant role in the extent to which the distinctive critical information needs of local communities are addressed. In a related study of the news workers within these local radio stations, Hood (2011) found a fairly consistent perspective that remotely-delivered news was a necessary response to the changing economics of contemporary media ecosystems. Research by Subervi-Velez (2010) that examined specifically how well Spanish-language radio stations are equipped to provide emergency information noted that the most significant shortcoming was that many of the stations in the markets studied were remotely operated and/or lacked any local news gathering personnel (see Section 1)..

However, radio has also been recognized as being uniquely well-suited to serving the unique needs and interests of specific communities within a market. This is well-illustrated by the rise of foreign language radio in many markets across the U.S.(see Castaneda Paredes, 2003). In a subsequent analysis of 49 radio markets in which Spanish-language commercial radio stations were present, Chambers (2006) found substantial product differentiation across Spanish-language stations within each market. Unfortunately, studies in this area have not yet explicitly examined the extent to which foreign language commercial radio stations are serving the critical information needs of their communities.

Public/Non-Commercial Media

Public/non-commercial media often are founded with the explicit intention of serving critical information needs that may not be adequately served by media outlets operating under purely commercial imperatives. Research has shown, for instance, that community radio and low power FM radio stations frequently are started with the explicit intention of addressing the critical information needs of specific community groups that other media outlets systematically neglect (see, e.g., Brand, 2004; Greve, Pozner, & Rao, 2006; Marchi, 2009; Sussman & Estes, 2005). For this reason, assessment of these small, community-oriented media outlets is an important part of determining the extent to which information addressing a wide range of critical information needs is available in any local media ecosystem. This is especially the case in light of recent research that suggests that the original vision of Lower Power FM radio, for instance, is to some extent being subverted by national organizations that are creating de facto programming networks that are undermining the extent to which LPFM stations are providing locally-produced news and information (Connolly-Ahern, et al., 2009).

Low Power FM and community radio are, of course, just one part of a larger public media system in the United States. Public television and public radio represent other relevant non-commercial contributors to local media ecosystems. The literature on public radio and television in the U.S. is varied and wide-ranging. Much of it deals with issues such as funding and its continued necessity or utility in an increasingly fragmented media market, given the notion that public broadcasting was founded, in part, on the premise that it would fulfill critical information needs that would not be adequately served by the commercial media sphere (see, e.g., Aufderheide, 1996; Berry & Waldfogel, 1999). There is also a growing body of literature exploring how public broadcasting can and should remake itself to better serve communities in the digital age (see, e.g., Clark & Aufderheide, 2009; Goodman, 2008; Minnesota Public Radio, 2009).

Unfortunately, there has been relatively little research that has rigorously examined public radio and television's contribution to serving local communities' critical information needs. Research by Napoli (2004) has shown that public television stations provide significantly less local news programming than their commercial counterparts; though these stations perform as well or better than commercial stations in their provision of local public affairs programming. Recent research by Ali (2010) found that, of 170 PBS stations studied, 14 produced a nightly newscast. Seventy-eight of these stations produced a weekly public affairs program, and 77 produced no local news or public affairs programming of any kind.

To some extent, analyses of the degree to which public broadcasting serves communities' critical information needs has been derived more from data on the extent to which different population segments consume public broadcasting content and less on robust analyses of that content. Survey research on media usage patterns suggests, for instance, that public television is primarily attracting a highly educated, highly affluent sector of the populace (see, e.g., Brooks & Ondrich, 2006; Ouellette, 2002). Such findings suggest that other audience segments are not finding public broadcasting a useful mechanism for meeting their critical information needs. Recent research has begun to investigate how public service media might better serve the information needs of traditionally under-served groups such as Spanish-language audiences (Wilkinson, 2010).

Local Broadband

When considering the how the Internet serves the critical information needs of local communities, it is important to first effectively separate online informational content that is unique to the Web from informational content produced initially for other media platforms (e.g., newspapers, television) that is being repurposed online. The widespread availability of such content is a relatively recent phenomenon; and as a result research focusing on such information platforms has only recently begun to emerge.

Researchers have begun to investigate the quantity and quality of news produced and disseminated via online platforms such as YouTube (Peer & Ksiazek, 2011). However, this research has yet to employ an orientation towards the critical information needs of local communities. Researchers have also begun to investigate the role of locally-oriented blogs in serving communities' critical information needs. Watson and Riffe (2011) examined public affairs blogs in 232 U.S. cities. Their results indicate that the quantity of public affairs blogs serving a community is best predicted by indicators of "community stress," such as crime, poverty rates, and physical decay. Another important predictor is the proportion of residents with professional occupations. According to the authors, "It is these residents—with more education and income, living on the periphery of the most affected urban neighborhoods—who are most likely to go online to write about obtrusive community problems" (Watson & Riffe, 2011, p. 879).

Perhaps the most extensive work in this vein has been conducted by Hindman (2011), who notes that, "for all of the discussion of local news online, there has been little systematic evidence about the local news environment on the Web. Arguments have waged mostly with anecdotes and assumptions instead of comprehensive data" (p. 2). Hindman (2011) analyzes over 1,000 local online news and information sources across 100 media markets, finding that independent online local news providers (i.e., those that are distinct from traditional media organizations) account for a very small proportion of the online traffic related to local news and information. He ends his analysis on the troubling conclusion that there is "almost no evidence that the Internet has expanded the number of local news outlets" (Hindman, 2011, p. 29).

Hyperlocal Media

There has been a growing body of research on hyperlocal media, mostly in the form of case studies of local ecologies that we reference on pp. 132-135 below. The major published study is by Kurpius et al (2010), which examines funding models for hyperlocal. But there has been no systematic academic scholarship on the changing *local news environment* and the effects of "hyperlocal," community, or citizen journalism on local democratic action and civic association. Friedland is currently addressing these questions through a series of cases studies on emerging hyperlocal and citizen news environments, defined as news about local community at the middle- or meso-layer (Friedland 2001; Kurpius et al 2011). This layer sits above that of personal blogging and social media use, and below the metropolitan news coverage we associate with commercial newspapers.

Since about 2005, there has been a rapid increase in hyperlocal reporting projects. In conjunction with J-Lab at American University and director Jan Schaffer, Friedland has expanded a comprehensive database of 1200 hyperlocal news projects, demonstrating the growth of the phenomenon. This data is broad but thin. It allows us to see the distribution of projects, their co-location in given metropolitan areas, and, to some extent, their birth and death rates (Hannan and Freeman 1989; Hannan et al 2007). To date, the project shows a distribution of hyperlocal projects as follows, using U.S. Census regional categories (http://www.census.gov/geo/www/us_regdiv.pdf):

Division	cases
Division 1 / New England	103
Division 2 / Middle Atlantic	130
Division 3 / East North Central	110
Division 4 / West North Central	78

Division 5 / South Atlantic	254
Division 6 / East South Central	65
Division 7 / West South Central	96
Division 8 / Mountain	139
Division 9 / Pacific	204

This database will allow a more systematic exploration of the types of hyperlocal projects that exist (local news, aggregators, lifestyle), their funding, management, and connections to other elements in their local media ecologies. As noted above, Friedland (2013) has also conducted a case study of the communication ecology of Seattle, which shows the systematic connection between the meso-layer and the local newspaper, but also the systematic investment of the city of Seattle in neighborhood based communication.

Local Social Media

There has been a substantial – and rapidly growing -- body of research on the usage of social media platforms (see, e.g., Rainie, Purcell, & Smith, 2011; Smith, 2011). However, relatively little of this research has, to this point, focused on the role that social media play in the production and dissemination of news and information that serves the critical information needs of local communities.

Research does, however, show that social networking sites are becoming an increasingly common platform for political discussion and debate (Rainie & Smith, 2012). Yardi and boyd (2010) have conducted one of the few analyses that have explicitly examined the flow of online news and information via social networks at the local level. Their study examines the flow of information on Twitter within two geographic communities, via the analysis of the tweets that emanated around specific events that occurred within these communities. The authors are primarily concerned with comparing the network characteristics (such as density and centrality) of local networks to non-local networks. Their findings also illustrate the increasingly important role that online social networks can play in the dissemination of critical local news and information; though their study does not seek to draw any conclusions regarding the overall performance of a platform such as Twitter as a means of meeting the critical information needs of local communities. Such analyses should certainly be a point of focus for future research.

Summary of Availability and Access to Relevant News

There are a number of general observations that can be drawn from the literature reviewed here. In terms of the substantive findings, it seems quite clear that traditional media outlets, even in the midst of the declines they are suffering in the face of new media platforms, continue to provide the bulk of the news "inputs" that circulate through a local media ecosystem. This is likely to change over time; which points to one of the key points of focus for future research -- to continue to map the production and flow of original news and information through the various platforms that serve a local community. Different media platforms definitely appear to serve different functions in local communities; and there is no reason to assume that these functions are static. Research needs to keep pace with this evolution of media ecosystems at the local level, so that policymaking can be well-informed by the distinctive roles and contributions of different platforms and outlets.

4. *Women and Minority Participation in Media Content Production and Distribution*

One of the key concerns that has guided policymakers' assessment of local media systems is the extent to which they are structured in ways that provide adequate levels of participation for women and minority groups. The term minority groups is meant to be wide-ranging; though, as will become clear in this review, the literature is overwhelmingly focused on issues related to the Hispanic and African-American populations. Nonetheless, such participation across the demographic, economic, and geographic spectrums long has been seen as fundamental to the Federal Communications Commission's commitment to diversity in media, and is guided by the assumption that the entirety of the population, as well as women and minorities, benefits when the greatest possible diversity of ideas and viewpoints, reflecting the full range of information needs in a local community, have the opportunity to circulate and be heard. However, a compelling case can also be made that the demographic characteristics of the owners, employees, or other participants in both traditional and new media organizations is of little measurable consequence in terms of affecting the extent to which the full scope of the critical information needs of communities are effectively met.

It is within this context that this section reviews the extant literature that can inform our understanding of the nature of the relationship between women and minority participation in media content and production industries, on the ability of media ecosystems to meet critical information needs of communities. This analysis will review the connections that social science research across a range of disciplines has identified between women and minority participation in media production and distribution and the fulfillment of communities' critical information needs.

As should be clear, the central research question that guides this section reflects a key point of legal and public policy debate in the communications policy sector for roughly the past four decades. Do media outlets owned or operated by women or minorities, or that have a workforce in which minorities and women are significant, or serve in prominent roles, serve communities' critical information needs in different or better ways than other media outlets? There is a long history of research that has explored this potential nexus between the demographic characteristics of media outlet owners, the demographic characteristics of media outlet employees and media content (see Bachen, et al., 2007; Kim, 2011). Kim (2011) refers to these potential interactions as the "triangle of minority ownership, employment, and content." Her meta-analysis of over thirty years of research that was either commissioned by the FCC, or recognized by the courts in those instances in which policies related to minority or female ownership or employment faced legal challenges, provides a number of findings that are relevant to this project. Her findings are organized according to each panel in the ownership-employment -content triangle, and the same approach will be employed here in summarizing her findings. First, in terms of the relationship between minority ownership and employment (with relevant studies dating as far back as 1981), she identifies eight studies that meet the criteria described above – all of which demonstrate a positive relationship between minority ownership of media outlets and minority employment.

However, as Kim (2011) notes, the bulk of these studies focused on radio and (to a lesser extent) television – leaving a wide range of both traditional and new media platforms and organizations largely uninvestigated in regards to this particular question. Moreover, statistically significant relationships were much more consistently found within the context of radio, rather than television. Examples of the significant findings identified in this meta-analysis include higher percentages of news and public affairs staff at minority-owned stations than at white-owned stations (Bachen, et al., 1999); and a higher frequency of minority and female presidents and CEOs among female-owned stations (Turner & Cooper, 2007).

Turning next to the relationship between minority employment and content, Kim (2011) identified only two studies meeting the above criteria; both of which did identify a significant statistical relationship between minority employment and minority-targeted media content; though in one instance minority-targeted content was defined in terms of owners' and managers' expressed intentions to provide content serving minority communities (Bachen, et al., 1999). This example is illustrative of a larger issue that has affected much of the government-sponsored and academic research investigating the relationship between minority ownership/employment and content – a tendency to rely on extremely superficial or (as in this case) indirect content indicators. This tendency arises for a number of reasons, including the logistical, resource, and interpretive challenges associated with empirical assessments of media content; and what might be termed a "chilling effect" on government-conducted research in this area, that arises from policymakers' hesitancy to engage in deep, robust assessments of media content due to the First Amendment concerns that naturally arise from such initiatives.

Turning finally to the most extensively researched component of the "triangle" – the relationship between ownership and content, Kim (2011) finds that a total of 13 of the relevant studies found a significant relationship between minority media ownership and content, while four did not. Once again, the focus in terms of the dependent variables for these studies is on factors such as station formats, program types, and management self-reports of programming intentions; though a select few of these studies delved a bit more deeply into content, assessing factors such as the frequency and prominence of minority issues and sources in news coverage. And once again the focus of this work to date has been overwhelmingly oriented toward broadcast radio and television.

There is, of course, also a larger body of empirical work – beyond that commissioned by the FCC and considered by the courts – that requires consideration in this context. Some of the most recent research in this vein provides evidence that a relationship does exist. For instance, a 2007 study examining the relationship between radio station ownership and station formats found that two thirds of minority-owned radio broadcasters aired minority-targeted formats (Turner & Cooper, 2007). A more recent study examining the same question concluded that the number now exceeds 70 percent (Sandoval, 2011).

Media economists Siegelman and Waldfogel (2001) have engaged in research examining this issue that has also attempted to take into consideration the impact of the market environment in which media outlets operate. Their research addresses the issue of whether small groups with distinct preferences—such as might be the case with racial and ethnic minorities—might be underserved by the radio market because the economic forces will favor stations that can deliver large numbers of people with similar preferences. Their study of the period 1993 through 1997 examined owner race, programming format, and total listening according to listeners' race and ethnicity for over 5,000 radio stations at each time period. Their analysis demonstrated that not only are content preferences between different minorities and Whites quite distinct, but that the amount of minority-targeted programming is dependent on the size of the minority population in that geographical area. However, even when controlling for such marketplace factors, their study still found that minority ownership increases the net amount of minority-targeted programming available. The authors reached similar conclusions in their analysis of 66 local television markets, though in this case the unit of analysis in terms of content was individual program type rather than station format (Siegelman & Waldfogel, 2001).

However, as Sandoval (2011) notes, program types/station formats alone represent a fairly narrow representation of many possible indicators of a relationship between minority and female media ownership/employment and the fulfillment of the full range of critical information needs for any community. And indeed a number of studies have employed a variety of different operationalizations of the ways in which content might be affected.

A study by Pease, et al. (2001) examined 12 news organizations (both print and television) deemed “model” news organizations in terms of their commitment to diversity. The study focused on: a) the relationship between management commitment to racial diversity in hiring and content; b) staff attitudes regarding issues of diversity in the workplace; and c) the actual content of the news product. A year-long content analysis was conducted, as was a survey of newsroom staffs. The results suggested that a greater commitment to newsroom diversity was related to a greater degree of news coverage of minority communities; though no meaningful relationship was found in relation to the tone of the coverage. The authors also compared their content analysis findings with previous research. The overall levels of coverage of minority issues and communities proved to be significantly higher in the “model” news organizations than were found in earlier research that examined a more generalized sample of news organizations. As the authors note, such differences could be attributable to differences in market characteristics.

A study by Rivas-Rodriguez, et al. (2004) examined similar issues via a very different methodological approach. Their research examined minority journalists’ perceptions of whether having minorities in management positions meaningfully affects news content. The researchers surveyed almost 800 minority journalists. The overwhelming majority of those surveyed indicated the belief that having minorities in management positions significantly improves the extent to which news coverage served the needs and interests of minority communities.

Some research in this vein has employed a case study orientation. Johnson (2004), for instance, conducted a case study analysis of Los Angeles-based, Black-owned community radio station KJLH-FM. Her analysis focused on the station’s role and function during the four days of rioting that took place in 1992 following the Rodney King verdict. Drawing upon data such as interviews and content analysis of the station’s flagship call-in program, Johnson concluded that the station was able to serve a uniquely powerful role in both empowering and unifying the African-American community during a very difficult time. These findings are reflected in earlier work by Catherine Squires (2000). Her case study of radio station WVON-AM in Chicago concluded, that “WVON and its listeners create alternative conversational and physical public spheres in which members of the audience circulate information and provide opportunities for community interaction and political involvement” (p. 73).

Importantly, both studies emphasize the critical role that Black ownership of these stations appears to have played in affecting the extent to which these stations were able to address the unique critical information needs of the Black community in these two cities. According to Squires (2000), for instance, “it is precisely because the station is owned and operated by Blacks that it is able to draw and sustain a substantial and loyal audience. Because they trust the station to ‘talk their talk,’ community members are enthusiastic about participating in the station’s conversational activities and are even willing to make personal financial contributions when advertising revenue is low" (p. 73). It is also important to emphasize that in both cases the impact of minority ownership was seen not only in terms of the extent to which these outlets produced and disseminated content of unique value to the Black community; but also in terms of the extent to which the stations functioned as important mechanisms for interaction among community members. These minority-owned media outlets served not only as disseminators of information but also as platforms for community engagement and conversation. In this regard, theses studies remind us that the Internet does not represent the starting point for interactive media.

A similar qualitative approach characterizes a recent study by Byerly (2011) on female ownership of broadcast outlets. Byerly interviewed 23 female broadcast station owners on a wide range of questions, including how they entered the broadcast market; how they define their role within their company; and (perhaps most relevant to this study) how they perceive their unique contributions to their communities. Perhaps the most significant finding of the study is the extent to which these female owners characterized themselves as absentee owners, playing relatively inactive roles in the operation and strategic direction of their stations. Byerly (2011) notes the contrast between this situation and the patterns illustrated in Sandoval's (2011) research on minority ownership (discussed above), in which a linkage between minority ownership and the way in which media outlets serve the information needs of their communities has been consistently demonstrated. In this regard, however, it is also significant to note that the only previous research addressing the female ownership-content relationship that Byerly cites is an FCC-commissioned study from the early 1980s. Consequently, Byerly (2011) rightly observes that, "Research is lacking to date that might establish a similar nexus between gender of owners and broadcast programming, but clearly such [research] is needed. If women have no involvement in the running of their stations, how can they represent women's interests by bringing women's voices and issues to the communities they serve?" (p. 40).

A similar emphasis on community service can be found in research that has had a more general focus on ethnic and foreign language media. This research often lacks the explicit focus on the demographics of ownership and personnel; though often, given the nature of these outlets, it is possible to assume the prominence of minority owners and/or personnel (particularly in the case of foreign-language media. Thus, for instance, the Radio-Television News Directors Association (Papper, 2011) recently reported that approximately 85 percent of TV news workers at Hispanic stations are Hispanic, compared with less than six percent at non-Hispanic stations. In a content analysis of 51 Latino and Asian-targeted newspapers in Los Angeles, Lin and Song (2006) found a tension between the need to provide coverage of local stories of interest to the immediate "geo-ethnic" community (which the authors contend are essential to community building) and stories covering activities taking place in the home countries of these community residents.

Research by Guzman (2006) offered a far too rare comparative approach in the assessment of the unique ways in which minority owned and operated media outlets serve the critical information needs of their communities. Her qualitative content analysis of the *Miami Herald*'s and the *El Nuevo Herald*'s coverage of the Elian Gonzalez custody case found substantial differences in terms of the ideological orientation of the coverage provided by the two publications. She concluded that the *Miami Herald*'s coverage was much more likely to provoke division within the community than its Latino-targeted, Spanish-language counterpart. In a comparative analysis of general audience and Native American newspaper (both print and online) coverage of a school shooting on an Indian reservation, Daniels (2006) found that Native American publications employed a greater diversity of sources and points of focus in their reporting than general audience publications.

Research by Felix, Gonzalez, and Ramirez (2008) focused on ethnic media's relationship to political mobilization. They provide a case study of the role that Spanish-language media played in mobilizing Latinos around the issue of anti-immigration legislation introduced in the U.S. in 2006. The authors gathered data from over 2,000 participants in workshops designed to help immigrants complete their application for U.S. citizenship. Participants were asked to provide information about their participation in protests against the legislation; as well as to provide information about their media usage habits. The results suggested that Spanish-language media played an influential role in encouraging Latinos to both take part in protests and to apply for citizenship; and were particularly important in terms of informing Latinos of the necessary steps to be taken in connection with the application process. Again, issues of ownership and personnel are not explicitly addressed in this study; but to the extent that research has demonstrated a very strong correlation between minority ownership/employment and minority-targeted content (see above), it seems relevant to address research in this vein, in light of the extent to which it does address the other side of the analytical equation – the service of communities' critical information needs.

If we recognize, as Section 2 has illustrated, that critical information needs vary to some extent with the demographic characteristics of a community, then it becomes increasingly clear that ownership and employment diversity can have a significant bearing on the extent to which content that serves the full scope of communities' information needs is available. However, a key observation that emerges from this assessment of this body of literature is that there has been little research that has investigated the connection between minority/female ownership or employment and genuinely robust indicators of critical community information needs. Research thus far has examined fairly general dependent variables such as station formats, and expressed intentions to provide content that serves minority interests. The Commission, however, has expressed an interest in developing a more explicit understanding of what exactly constitutes the critical information needs of a community; and as the exploration of this issue in Section 1 helps to illustrate, those more explicit articulations of the critical information needs of communities are not well-reflected at this point in the literature that has sought to investigate the relationship between minority/female ownership and employment and the performance dimensions of media outlets.

Research that has delved more deeply into how minority-owned and operated media serve critical information needs has tended to do so in ways that are explicitly focused on those specific media outlets; and thus often lack the comparative dimension that facilitates assessment of the *differences between* minority- and non-minority owned and operated media. Thus, for instance, research has examined how certain critical information needs – such as health information – have been addressed by minority owned or targeted media outlets such as Latino newspapers (Vargas & dePyssler, 1999). Ownership and personnel characteristics are not a specific variable of focus for the analysis, though this study does provide a welcome effort to identify and rigorously assess these outlets' fulfillment of a particular critical information need for the Latino community. Through a content analysis of daily and weekly Latino newspapers in six major U.S. cities, this study concluded that these papers were providing a large quantity of health coverage, but that this coverage was lacking in terms of a variety of qualitative dimensions. In particular, this study concluded that these newspapers were consistently failing to frame the information provided in ways that emphasized its unique relevance to Latino readers (Vargas & dePyssler, 1999).

Subervi-Velez (1999) conducted a similar study of health information provision by Spanish-language television stations. His content analysis of two national Spanish-language newscasts and 12 local Spanish language newscasts (spanning six major U.S. media markets), found that approximately 20 percent of the news stores analyzed addressed the story's specific impact on the Latino community. This is a higher level than was found in the Vargas and dePyssler (1999) study; though obviously the large majority of the stories analyzed still were not framed in terms of the unique needs and interests of the Latino community (though, as the author notes, such a community-specific point of reference for a particular news story may not always exist). And while this study offers some comparisons with English language television news, these comparisons are drawn across other studies, rather than contained within the design and analysis of this particular study.

Again, it is important to emphasize that neither ownership nor personnel demographics and their possible relationship to the extent to which they might have factored into the extent to which these media outlets effectively served the critical health information needs of Latino readers were assessed in these studies. Certainly such an approach might represent a fruitful direction for future research.

Summary of research on women and minority participation

In sum, the research to date seems to provide compelling evidence that women and minority ownership, and participation in the operation, of media outlets has a significant effect on how these outlets address the needs and interests of their communities. This conclusion is limited, however, in a couple of important respects. First, the operationalization of minority groups has focused quite heavily on groups such as Hispanics and African-Americans; whereas other minority groups, whether it be particular ethnic groups, or other potentially marginalized groups (such as people with disabilities), have been the focus of little, if any research seeking to establish relationships between ownership, employment, and content.

Also, based on this review of the literature, there would seem to be an opportunity for future research to develop more robust measures of the extent to which different communities' critical information needs are being met; and to investigate whether the extent to which these critical information needs are being met is a function of the demographic characteristics of the owners and employees of both the new and traditional media outlets in these communities. This point is a reflection of the fact that, while a substantial body of research has demonstrated significant relationships between women/minority ownership/employment and content, this research has not always examined content at a level of detail or rigor that would meet the criteria being discussed here -- *critical information needs.* Obviously, this concept represents something a bit more robust than, for example, differentiation in the program types/formats provided by different types of owners.

In this regard, it is also important to emphasize that research in this vein has -- as of yet -- moved quite slowly into the online arena, with some limited exceptions. Katz, Matsaganis, and Ball-Rokeach (2012), for instance, illustrate the instrumental role that traditional ethnic media outlets (outlets which are typically – if not always – minority-owned and operated) can play in facilitating broadband adoption in minority communities. Wilson and Costanza-Chock (2011) have taken the first important steps in terms of documenting and assessing the levels of minority employment in online news organizations, showing levels that appear to be somewhat higher than those typically found in traditional media. However, what is lacking at this point is research that builds upon and extends the research reviewed here that has examined the nexus between ownership, employment, and content in traditional media contexts. In the multi-platform local media ecosystems of today, it is essential that research addressing the ownership- employment-content relationship move well beyond the confines of traditional media and seek to inform our understanding of new media platforms and outlets and how they compare, contrast, and interact with traditional media in terms of their service to communities' critical information needs.

IV. Barriers to Content and Services for Critical Information Needs

5. *Barriers to Participation in Content Production, Distribution and/or Communication Technologies*

Evidence of the type discussed above, that diversity in the ownership and operation of various types of media outlets can be significantly related to how the critical information needs of different sectors of a community are served, is a key factor that underlies ongoing concerns about whether there are persistent barriers that affect the ability of certain segments of society to fully and equally participate in the various components of media content production and distribution, as well as in terms of adopting and utilizing the communication technologies that are integral to such participation. Thus, this section reviews the research that addresses the persistent question: What are the barriers that Americans face in participation in content production and distribution industries or adopting communication technologies?

It is important to emphasize that, in the contemporary media environment, participation in media content production and distribution can take a much wider array of forms than has traditionally been the case – many of which involve activities outside of formalized media organizations. In this regard, diversity of participation – and the potential barriers to such participation – extend beyond the organizational level to the individual level. Thus, this section addresses factors that can impact both organizational and individualized media access and participation. This section reviews the relevant literature that has examined whether women and minorities encounter barriers that have impeded their ability to participate in the ownership and operation of media organizations, as well as the literature that has examined whether barriers exist for these groups in terms of individualized participation in the contemporary communication infrastructure. Within this context, the focus is less on issues such as minority media ownership and employment, and more on issues such as broadband adoption and deployment and digital media literacy amongst various minority populations.

Barriers to Participation at the Organizational Level

Researchers have examined a variety of possible impediments to participation in media content production and distribution organizations. Much of this research has focused on barriers to female and minority ownership of media organizations and, to a lesser degree, on barriers to female and minority employment within media organizations.

One area that has received significant attention involves spectrum access. The processes via which the government allocates spectrum (whether it be by comparative hearing or auction) have been examined to determine whether there are specific barriers that have impeded female and minority participation in the media and telecommunications services that rely upon spectrum.

The Federal Communications Commission, as part of its landmark series of Section 257 studies conducted in the late 1990s, commissioned research that specifically examined the process of spectrum allocation as part of its broader inquiry into barriers to female and minority participation in media content production and distribution (see Bradford, 2000; Ernst & Young, 2000; Ivy Planning Group, 2000; KPMG, 2000; Ofori, 1999). This research found evidence of multiple barriers to entry in relation to the obtaining access to spectrum. Perhaps the most prominent of these involved discrimination in capital markets (in terms of both obtaining capital and in terms of the interests rates in instances when access was provided). In addition, when controlling for multiple explanatory factors, this research also found evidence that women and minorities were significantly less likely to emerge as winners in FCC-conducted spectrum auctions and broadcast license allocations (Bradford, 2000; Ernst & Young, 2000; KPMG, 2000)

More recent research, inspired by the Commission's initial research, that has focused on the process of spectrum auctioning, similarly found that, when holding other factors constant in a multivariate regression, the odds that a minority-owned or woman-owned business even qualified to bid were lower than the odds for other types of businesses, for the time period from 1995 through 2006 (Howard & Smith, 2007). The authors thus concluded that "the FCC's auction process is still something of an entry barrier to diversity in the ownership of the public spectrum" (Howard & Smith, 2007, p. 226). As for the reasons this appears to be the case, the authors speculate on a number of possibilities, including lack of economic capital, or a lack of understanding about the process.

The FCC's Section 257 research into the relationship between advertisers and minority-targeted media, which found that minority-targeted media outlets faced significant economic hurdles (primarily in the form of advertisers' undervaluing or avoiding their audiences) (Ofori, 1999) also inspired follow-up research. Napoli (2002), for instance, examined the relationship between minority audience composition and advertising revenues in radio, finding that both Black and Hispanic audience composition were significantly related to lower CPMs (cost per thousand) that stations were able to charge for their audiences. As is the case with a number of the studies addressed in this review, this study did not isolate minority ownership as a distinct explanatory factor. In this regard, its relevance to our understanding of the barriers to participation for minorities in content production and distribution is a function of the well-documented relationship between minority ownership and content targeting the unique critical information needs of minority communities (see above).

The same perspective can be found in other research that has taken a more expansive approach to analyzing the dynamics of media markets, in an effort to determine what barriers might exist for minority targeted media content – and, by association, minority-owned media outlets and (to perhaps a lesser extent) to the employment prospects of minority media professionals. The key recurring theme of much of this research involves the prominence of "preference externalities," which lead to the relative under-provision of content directed at the needs and interests of minority communities (see, e.g., Berry & Waldfogel, 2010; Brown & Cavazos, 2002; George & Waldfogel, 2003; Siegelman & Waldfogel, 2001; Waldfogel, 2003). Essentially, minority audiences, by their very status as representing a small proportion of the available audience, are unable to provide the necessary revenue to content providers to sufficiently incentivize the production of a proportional amount of content directed at their particular interests and concerns.

Recent research inspired by this line of inquiry has examined the impact of preference externalities specifically on the provision of local news content; and has extended the analytical reach beyond the Black and Hispanic focus of previous research – examining instead the availability of radio content directed at the information needs and interests of 19 different language groups (Wang & Waterman, 2011). The results once again confirmed the preference externalities phenomenon, with minority groups consistently being provided with levels of content well below the proportion of the population that they represent. That this result held true specifically for local news content is of particular important to our understanding of the barriers that might affect minority participation in the media sector and, by association, the extent to which the critical information needs of minority communities are effectively served. Related research has also suggested that population heterogeneity plays a role not only in the quantity of news and information directed at different demographic groups, but also in producing greater accuracy and less bias in the news that is produced (Mullainathan & Shleifer, 2005).

The key implication of the preference externalities body of research is that, when considering the potential barriers facing minority ownership and employment, it is important to recognize that the market for minority-targeted content faces some inherent economic handicaps that can have significant ripple effects on both minority ownership and employment (given the demonstrated strength of the linkage between ownership/employment and content). Given this set of circumstances of apparent market failure, it is perhaps not surprising that the question of whether minority-targeted media content represents distinct product markets has been a topic of recent debate (see, e.g., Sandoval, 2008).

However, as should be clear, all of this research to date has focused on traditional media platforms such as radio, television, and newspapers; which of course raises the question of if – or to what extent – such preference externalities are manifest in the online arena as well. This question is of particular importance in light of the common assumption that one of the defining characteristics of the new media environment is the extent to which barriers to entry are lower on new media platforms than they are on traditional media (see Ford-Livene, 1999). Such issues reflect the broader question of how the economics of the new media environment compare to those of traditional media, and what these comparisons might mean for sources and content directed at serving the critical information needs of minority communities.

Some research has interrogated the lower barriers to entry presumption, particularly in terms of the extent to which it reflects the reality for female or minority-initiated new media enterprises. Ford-Livene (1999), for instance, concluded that minority-owned new media ventures face a variety of distinctive challenges. Some of these challenges are extensions of those that have been documented in the traditional media space. One such recurring challenge involves attracting advertising revenue in an environment in which minority audiences are frequently valued less than white audiences (Ford-Livene, 1999)[2].

[2] We note that there have been significant developments in research and the nature of the internet since the 1990s but believe that these findings still hold true and reflect the state of knowledge over the entire time span we are covering for this literature review.

Access to capital is another such recurring challenge. Celli and Dreifach (2002) refer to a "Capital Divide" affecting the prospects for minority-owned new media start-ups (p. 62). According to the authors:

> The theory of a "capital divide" is more than the suggestion that racism is afoot in the business world. The Capital Divide involves deep structural barriers that are peculiar to startup businesses in general and Internet startups in particular, and which may make it even harder for racial and ethnic minorities to win acceptance in the world of Internet business than in other business fields. . . . At its most benign, the problems confronted by minority Internet entrepreneurs may be seen as structural in nature. Not infrequently in a culture where race and material success are correlated, such persons were often among the first in their families to have contact with the capital markets. As such, they lacked the extended "old boy" or family network of potential investors that most entrepreneurs tap first for investment dollars. (Celli & Dreifach, 2002, pp. 62-63)

Other potential barriers are reflective of some of the broader inequalities that have come to characterize the new media environment. Thus, for instance, Ford-Livene (1999) emphasized the impact that inequalities in digital access can have on minority-owned new media ventures. As she notes, "Minority-owned new media ventures cannot survive if their target audience does not have access to the required information technology" (p. 586; see below for a detailed discussion of the digital divide literature).

Research suggests that barriers may exist not only at the level of ownership and operation of minority-owned and minority-targeted media organizations, but that minorities seeking to work in such organizations may encounter a variety of barriers as well. Hiring and compensation practices are the key issues of concern here. The issue of minority and female under-representation in the workforces of a wide range of media-related sectors has received a substantial amount of research attention (see, e.g., Braunstein, 2000; Pugh & Dearfield, 2012).

A 2007 study of the television industry, for instance, found that minorities constituted less than 10 percent of all television writers; and that these writers were paid, on average, more than 25 percent less than their non-minority counterparts (Hunt, 2007). According to this same report, women accounted for 27 percent of all television writers, with no significant disparity in earnings when compared to male writers. In a more recent iteration of this study, minority writers still accounted for roughly 10 percent of all television writers and earned average salaries that were approximately 23 percent lower than white writers. According to this more recent report, women accounted for roughly 28 percent of all television writers and earned an average salary that is approximately ten percent less than their male counterparts (Hunt, 2011). Comparing the results from these two time periods suggests that there are no meaningful trend lines toward improvement at work. Such disparities in terms of employment and compensation represent a significant barrier to participation, as they not only represent a more limited range of opportunities for women and minorities, but also profound disincentives for women and minorities to choose these career paths over other career paths, where there may be greater equality in terms of opportunity and compensation. In an analysis that focused specifically on female employment in television journalism, Pugh and Dearfield (2012) found that women have represented approximately 40 percent of television newsroom employment over the time period from 2004 through 2011; though over this same time period women represented between 25 and 29 percent of television news directors. In an analysis of the radio news workforce, Pugh and

Dearfield (2012) found that women represented between 20 and 29 percent of the workforce since 2004, and between 25 and 11 percent of news directors during this time period (with a strong downturn since 2009).

Turning to print journalism, Pugh and Dearfield (2012) also examined female employment in local newspapers. Their results show that females comprised approximately 37 percent of the newsroom workforce in 1999, with that percentage holding relatively steady over the next decade, until a recent uptick to approximately 41 percent in 2011. Wilson and Costanza-Chock (2011) draw upon data from the American Society of Newspaper Editors (which surveys all U.S. newspapers) to provide a current portrait of the state of minority employment. According to the ASNE's most recent data, minorities account for 12 percent of print journalists in the U.S., while accounting for over a third of the U.S. population (American Society of Newspaper Editors, 2012). Particularly troubling is the decline in recent years in the overall proportion of journalists accounted for by certain minority groups. It is interesting to note that the ASNE also gathered data on online journalists employed by newspapers. The most recent of these data indicate that nearly 18.7 percent of online journalists are people of color – a proportion that is significantly higher than what is currently found in the print space. ASNE cautions, however, that these data rest on too small a sample to be considered truly representative.

Similar trends are evident in television and radio journalism. Data gathered by the Radio-Television News Directors Association (Papper, 2011) demonstrate a slow increase from a 17% minority TV workforce in 1995 to about 21% in 2011. During this same time period, they find a decline in the radio workforce from 15% to 7% people of color. As Wilson and Costanza-Chock note, "If we zoom out to a longer view, once again we find that the employment rates for people of color in commercial broadcasting do not even keep pace with changing demographics" (Wilson & Costanza-Chock, 2011, p. 8).

The National Association of Black Journalists (Butler, 2011) conducts similar analyses that focus specifically on the presence of people of color in management positions at local television stations. Their most recent assessment of 228 local stations found that people of color occupied only 12 percent of newsroom management positions at these stations (Butler, 2011). The study also found that over half of the stations analyzed had no people of color occupying any of the six position categories that were identified in the study as management positions (Butler, 2011).

Wilson & Costanza-Chock (2011) also examine public broadcasting, using employment data that the Corporation for Public Broadcasting has gathered since 1978. According to the authors, these data show a slow and steady increase in minority employment from 1978 (12.6% in radio, 13.9% in TV) to 1998 (19.6% in radio, 18.8% in TV) (Wilson & Costanza-Chock, 2011). However, according to Wilson and Costanza-Chock (2011), this was followed by stagnation for most of the last decade, with the most recent CPB data indicating public radio minority employment at 19.8 percent and public TV minority employment at 19.4 percent.

Barriers to Participation at the Individual Level

As was noted above, in the contemporary media environment, understanding potential barriers to participation in media content production and distribution at the individual level has become as (if not more) important as understanding such barriers at the organizational level. Today's communications infrastructure empowers the individual content creator to an unprecedented extent; and thus the opportunities to produce and disseminate information are as deeply impacted by any inequalities or barriers to participation as the opportunities to receive information. And, as will become clear, many of the same barriers affecting minority participation

A useful starting point for this assessment is the Knight Commission's (2009) report, which concluded that the contemporary media system currently suffers from three types of gaps that affect individual media users: a) a broadband gap; b) a literacy gap; and c) a participation gap. Each of these will be described in greater detail below. And, within each of these gaps, it is important, as Hammond (2002a) argues, to distinguish between causes, manifestations, and consequences.

These multi-faceted breakdowns of the digital divide are reflective of a history of definitional debate, in which a phenomenon that was initially defined in fairly narrow technological terms (the presence or absence of Internet access), has over time been more robustly conceptualized to include availability, affordability, compatibility (in terms, for example, of language), and literacy/skill sets (see Hammond, 2002a).

The first gap represents a gap in access to the relevant communications infrastructure, which in the contemporary communications environment generally means wireline and/or wireless broadband Internet access, and the relevant hardware for engaging with these infrastructures. For a number of years, the National Telecommunications and Information Administration (NTIA) engaged in a rigorous assessment program focused on documenting the exact nature of the digital divide in America (see, e.g., NTIA, 1998, 2000). It is important to note that, not only did the NTIA assess and monitor divides in computer and Internet access amongst minority populations; but also in terms of criteria such as age, gender, income, disability status; and location (rural v. urban). The NTIA's assessment program was terminated over a decade ago. This diminished governmental attention to digital divide issues is, according to Wilson and Costanza-Chock (2011), reflective of a widespread diminished concern about the digital divide over the past decade, due to the adoption rates that have characterized the past decade across a wide range of demographic and geographic groups. According to these authors, "To non-experts in government and among funding agencies, the subject of the digital divide seemed to become less pressing than before" (Wilson & Costanza-Chock, 2011, p. 13). Consequently, programs aiming to increase Internet access to underserved populations had their funding cut, and financial support for digital divide research gradually dried up (Wilson & Costanza-Chock, 2011).

It is worth noting here, however, that the process of mapping many of the relevant criteria necessary for understanding the extent, causes, and consequences of contemporary digital divides in local communities has been fraught with its own unique set of challenges and controversies. Definitional and measurement issues have led to uncertainty and inconsistency in efforts to measure various dimensions of the digital divide (see, e.g., Barzilai-Nahon, 2006; Vehovar, et al., 2006), such as, for instance, the current state of broadband deployment and competition (see, e.g., Hammond, 2002b). However, since the systematic efforts by the NTIA to document the current state of the digital divide in various communities that was abandoned over ten years ago has not been reinvigorated, this leaves an important federal-level data gap in our current understanding of the various aspects of the digital divide.

According to very recent assessments, however, some digital divides do remain; though the role of race as an explanatory factor is dramatically diminished. For instance, today, 80 percent of the White population in the U.S. uses the Internet, compared with 71 percent of the Black population and 68 percent of the Hispanic population. However, when accounting for other explanatory factors, neither race (nor, for that matter, gender) are significantly related to the likelihood of using the Internet (Zickuhr & Smith, 2012). Also important is the fact that issues such as cost, knowledge, and access have diminished substantially as reasons given for non-Internet use. Rather, today, by far the most common explanation given for not using the Internet is "Just not interested" (31 percent). The next most common explanation is lack of computer ownership (12 percent) (Zickuhr & Smith, 2012).

A key theme of this research is that many of the original barriers to online access have been overcome by the availability and widespread adoption of cheaper mobile technologies such as smart phones (see Wareham, Levy, & Shi, 2004). And indeed, we see that the means by which individuals access the Internet do differ substantially by race. Specifically, 38 percent of Blacks and Hispanics identify their cell phone as their primary means of accessing the Internet; compared with 17 percent for Whites (Zickuhr & Smith, 2012). Such patterns invite the question of whether mobile Internet access is an acceptable substitute for home broadband access in terms of its ability to satisfy the individual's ability to meet the full range of their critical information needs and to engage in the full range of content production and distribution activities that are achievable via access to a computer with a home broadband connection. Just as it quickly became clear that it was reasonable to question whether dial-up access represented an effective substitute for broadband access (see Horrigan & Rainie, 2002), so too does it seem reasonable to question – and to empirically explore – if and how mobile devices are effective substitutes for computers with broadband access; and, for that matter, vice versa. Hassani (2006) has found evidence that Internet access via a home computer (as opposed to via work or schools/libraries) is significantly related to engaging in a variety of information-seeking activities, suggesting that there are tangible benefits to home access. However, little research at this point has engaged in similar comparative analyses between home and mobile Internet access.

The goal here is, however, less about mapping the past and current state of the digital divide, and more about understanding its implications, particularly in terms of its impact on the extent to which the critical information needs of communities are effectively served. Allen Hammond (1997), one of the leading scholars of the digital divide affecting minority communities, and the divide's implications for those communities, provided some of the earliest indicators of the ways that the digital divide was affecting minority communities. As he demonstrates, a lack of access to digital communications technologies affects a community on a variety of fronts, ranging from political efficacy, to educational and employment opportunities, to community economic development and wealth (Hammond, 1997). In an analysis that focuses on the Native American community, Bissell (2004) demonstrates how problems confronting this community, such as high unemployment and poverty, are directly linked to the lack of basic communications infrastructures and technologies on many reservations. In these analyses we see access barriers to the digital communications infrastructure impacting the full range of critical information needs outlined in Section 1.

It is important to understand that there may be a variety of underlying causes affecting these technological manifestations of the broader digital divide. They can be a reflection of income differentials that lead to the inability of individuals to afford particular technologies or services (see, e.g., Dailey, et al., 2010). They can also be the byproduct of practices such as "redlining," in which specific geographic areas are intentionally neglected in terms of infrastructure development on the basis of an infrastructure provider's cost-benefit calculus (see, e.g., Hammond, 1996). Research has, however, at this point been mixed in terms of its conclusions as to whether a community's racial composition serves as a distinctive explanatory factor for the extent of broadband deployment in individual geographic areas (see, e.g., Prieger, 2002). Of course, given that race and income correlate, the effect on minority communities and the extent to which their critical information needs can be effectively served persists.

We turn next to what the Knight Commission referred to as the "literacy gap" and its potential implications for the extent to which the critical information needs of women and minorities are being effectively served. Here, the focus is on the knowledge and skills that bear upon how individuals utilize their Internet access; and to what extent they have the skill sets necessary to effectively navigate the digital media environment to meet their critical information needs; as well as the extent to which they are capable of serving as information producers and disseminators (and in so doing contribute to the fulfillment of the critical information needs of other members of their community). One can think of this line of inquiry as emerging in the wake of diminished concerns about the technologically-focused gap discussed above. According to Wei (2012), "There has been a recent conceptual shift in the research of the digital divide. As the Internet has penetrated most parts of the world, the original access divide gradually shrinks while a new form of digital divide, the usage gap, emerges" (p. 303). For a more thorough review of this literature and its evolution than space permits here, see DiMaggio, et al. (2004).

This issue was recently discussed in a *New York Times* article that documented the differences between young people of different income categories in terms of how they spend time online, as well as with other communications platforms. (Richtel, 2012) As the *Times* piece's title noted, "Wasting Time is the New Divide in the Digital Era." And as the article went on to illustrate, young people in poorer households spend significantly more time on online activities that lack a clear educational value (such as playing video games, watching movies, engaging with social networking sites, etc.) than do young people in wealthier households (Richtel, 2012). The key implication of these findings is that access to technology alone is not necessarily a solution to digital divide-related problems. Other aspects of the divide can become exacerbated once technology access is granted.

Hargittai (2007) has examined how individuals navigate the online environment for local informational content. Her analysis accounted for a variety of factors (including ethnicity) that might impact the extent to which individuals are able to effectively navigate the Internet for various types of local information. Her study found no significant relationships in terms of race/ethnicity; though she did find a negative relationship with gender, indicating that women found it significantly more difficult to locate this information online (see Hargittai, 2002 for some conflicting conclusions in regards to gender). In related research examining the differences between perceived and actual Internet navigation skills among men and women, Hargittai and Shafer (2006) found no significant differences in terms of actual navigation skills; but that women perceived their skill levels to be significantly lower than they actually were. The authors note that such patterns have the potential to curtail women's online behavior and to limit the types of uses to which they put the medium.

Recent survey research has uncovered persistent differences between men and women in terms of their engagement in more "advanced" types of Internet activities; though within the context of multivariate analyses this study found no significant differences between men and women, or between whites and non-whites in terms of the variety of online activities in which they engage (Wei, 2012). Age and socio-economic status, however, persist as significant explanatory factors, suggesting that "The structural inequalities that have existed since the emergence of the access divide persevere" in the form of a usage divide (Wei, 2012, p. 313).

This line of inquiry has been extended into the realm of individuals' online content creation and dissemination. Via survey data on young peoples' online activities Hargittai and Walejko (2008) explored the possibility of significant differences across gender and race/ethnicity lines across a variety of online content creation and distribution activities. While some significant differences emerged amongst the descriptive data, in the multivariate analyses gender and race/ethnicity were not significant factors (only age emerged as a significant predictor in the full explanatory model). In a similar, larger-scale analysis of survey data gathered by the Pew Internet and American Life Project, Schradie (2011) found that race and gender were significantly related to a variety of online content creation and dissemination activities. In the case of Blacks and Hispanics, it was often the case that members of these groups were more likely, rather than less likely, to engage in many of these activities. For women, however, the relationship was consistently negative. Education, however, emerged as the most consistently significant explanatory factor.

Finally, we reach the third type of gap identified by the Knight Commission (2009), the participation gap. The participation gap is defined as the difference in social experiences between individuals who have a high degree of access to new media technologies and those who do not. Here, we are essentially talking about how the two previous gaps manifest themselves in disparities between groups' abilities to effectively participate in various aspects of economic and political life. As Cooper (2002) has argued, taking a rigorous approach to understanding the digital divide involves "digging beneath the surface indicators of the divide, computer ownership and Internet connectivity, and boring down into behavioral implications, such as civic participation." (p. 73).

Research has begun to investigate such relationships. Wei (2012), for instance, found a significant positive relationship between the multimodality of an individual's Internet usage (i.e., the extent to which an individual engages in the full range of available online activities) and various forms of political participation, ranging from attending and organizing political events, to volunteering for a political party or candidate. Shah, et al. (2001) found that informational Internet use had a small but significant relationship with community participation. A following study by Shah et al. (2005) indicated that online media complements traditional media to foster political discussion and civic messaging. In a meta-analysis of research addressing this issue, Boulianne (2009) found a small, but significant, positive relationship between Internet use and political participation. It is important to note that some of the research in this vein causality is sometimes difficult to ascertain (see Polat, 2005).

Moreover, in a thorough review of the literature in this area, DiMaggio, et al (2004) note:

> "The big question, about which we know rather little, is whether Internet use exacerbates inequality in political engagement and social participation. High status people are more likely to be on-line, and probably use the Internet to influence the world around them more than others because they were more politically involved *before* they went online. On the other hand, Internet use may have a larger *net* effect on the behavior of socially

> and politically engaged users with fewer resources, for whom the advantages the Internet affords may be correspondingly more important." (p. 45)

This accumulated research on organizational and individual barriers to the various forms of participation in media content production and distribution, and on their associated relationships with various dimensions of community participation, points to an important next step in communications policy research: developing a coherent, multi-dimensional approach to the concept of participation and its operationalization in the realm of communications policymaking (for a discussion of the various interpretative approaches to participation, see Cornwall, 2008).

On a related front, a number of scholars have begun trying to theorize what a policy-relevant conceptualization of participatory diversity might look like (see, e.g., Aslama & Napoli, 2010; Fuentes-Bautista, 2011). As Fuentes-Bautista (2011) states: "In analyzing how public interest policies may transition to networked scenarios, media scholars agree that a critical dimension of the redefinition of media diversity and localism policies is the conditions under which the participation of diverse local publics is produced" (p. 2). Some policymaking bodies have begun working toward explicit operationalizations of this general concept. UNESCO, for instance, has defined participatory communication along three dimensions: a) access (which stresses the use of the media for public service functions and the availability of a broad array of choices); b) participation (which involves a higher level of involvement in the production process, as well as in the management and planning of communication systems; and c) self-determination (which refers to the extent to which members of the public own or have autonomy over the operation of communication or media organizations). Future research should seek to develop and implement a multi-level analytical framework that could be employed in assessing local communities, and the extent to which barriers to participation are affecting the extent to which their critical information needs are being met.

Summary of Barriers

This review of the literature has identified barriers to women and minority participation in media content production and distribution at multiple levels. At the organizational level, there appear to be both economic and regulatory impediments that have historically hindered greater diversification of media ownership. At the individual level, this review has illustrated that the concept of the digital divide, which has been a central concept in the understanding of barriers to participation in the contemporary media ecosystem, is very much a moving target, evolving as technology has evolved and diffused through the population. Recent research has been capturing a variety of emerging dimensions of participation in the contemporary media ecosystem; and in so doing has been illustrating how technology adoption/diffusion at the individual level; and, at the organizational level, the lower barriers to entry that generally categorize new media platform, do not appear to be sufficient for addressing the disparities in participation in content production and distribution that persist across different population groups.

V. Performance Metrics and Methodologies for the Analysis of Critical Information Needs

6. *Prevailing Performance Metrics and Methodologies for the Analysis of Critical Information Need*

As should be clear at this point, the dynamics of contemporary local media ecosystems have become increasingly complex in ways that compel expanded analytical approaches that build upon and integrate more established analytical approaches and that seek to capture the complex production processes and flows of critical information within a local media ecosystem.

This section focuses on identifying recent research from across the disciplinary and methodological spectrum that has employed analytical approaches and/or performance metrics that have the potential to meaningfully inform future efforts at developing robust, comprehensive analyses of the extent to which critical information needs are being fulfilled within local communities. This section will also focus on identifying data gathering/analysis strategies and data sources that have been created in connection with this research that could prove relevant for future research efforts.

Ecological Methods

The empirical study of communication ecology is rooted in the sociology of human ecology. The following draws from Popielarz and Neal (2007). The study of human ecology begins with Simmel's "Metropolis and Mental Life," (1950 [1903]) who argued that human behavior is shaped by the environment, particularly in the city. The ideas were developed by Robert Park, of the University of Chicago, who grounded the human-environment relationship in the spatial order of the city (Park et al. 1925). The Chicago School founded by Park was both strongly ecological (with mapping of social relationships against urban space) and grew from ethnographic investigation of human relations. The spatial line of work was continued and developed by Amos Hawley, who codified the tradition in the classic *Human Ecology* (1950). However, Hawley became critical of the overly spatial orientation of the tradition, and began to examine the bioecological problem of how organisms interact with and adapt to their environments, which led him to a formal develop of the concept of the niche (Hawley 1992).

Two of Hawley's students, Hannan and Freeman (1977) built on his concept of the niche to recast the sociology of formal organizations. Their work considers the formal ecological mechanisms of variation, selection, and retention in an empirical program spanning 30 years that built both theory and empirical tests of how organizations adapt to each other in complex environments. This line of work has been powerfully adapted by Monge and collaborators who have articulated the role that communication plays in organizational evolution.

A second "social structural" line of sociological ecology grows from Simmel's "Web of Group-Affiliations" (1955 [1922]). Drawing from Lazarsfeld's work on property spaces and Merton's on social structure, Blau (1977, 1984) articulated the multidimensional spatial conception of social structure (a model of structure based on intersecting variables rather than physical space). This, in turn, laid the foundation for McPherson's ecology of affiliation (1983). McPherson united Blau's multidimensional space with the niche model (from formal ecology) and the development of the concept of social homophile, the idea that people affiliate with networks of like others.

Most recently, the ecological model has been extended by Robert Sampson of Harvard Social Sciences in his *Great American City* (2012). Sampson summarizes his long-term research program in Chicago, through a systematic examination of the city and its neighborhoods, grounded in a combination of Census tract and neighborhood level analysis, extensive observation, multi-level quantitative modeling combined to create an “ecometrics,” a precise set of approaches to analyzing ecological change in cities.

Taken together, this ecological research program offers a framework that can be adapted to the current and future study of communication ecologies through abstracting the core and operationalizing it. The ecological framework depends on establishing a precise geo-demographic baseline for a given community, which can now be done through wedding census data to Geographic Information Systems (GIS). This framework is the structure within which the actual flows of communication and information can then be situated, using the methods of content and network analysis discussed below.

While we recognize that the above discussion is abstract and truncated, we offer it to demonstrate a) the deep roots of the community ecological tradition in sociology; b) the development of a number of successful research programs by leading scholars based on this tradition; and c) the extension of the tradition into communication via Monge and collaborators. While Monge has developed the formal line of Hannan and Freeman, two other communication scholars have returned to the original Chicago tradition of urban space to examine the ecological social structure of the city.

Friedland (2001), drawing on previous work with McLeod on community integration (1999), developed the theory of communicatively-integrated community, the idea that there are divisions of both space and social networks in the metropolitan environment, that are integrated by different forms and types of communication. His multi-level model integrated community-wide communication at the macro- or metropolitan level; meso-level communication in community areas and neighborhoods; and the micro-level communication of interpersonal networks both face to face and online. This framework became the basis for multi-year study of the community communication ecology of a single mid-sized city, Madison, Wisconsin. Drawing from earlier work of Laumann and Pappi (1973) on networks of collective action, Madison was chosen not for its “typicality” or generalizability, but as a communication laboratory large enough to contain the full range of communication media and relationships in a modern American city, but small enough to completely inventory those relationships and observe their interactions.

Friedland, Long, Shin, and Kim (2007) examined the complex effects of communication ecology on a major community education controversy in Madison They developed a model of the interconnected effects of newspaper reporting, local social networks, and online communication, illustrated the ecological method, and demonstrated the isomorphism between community networks and media networks, as they changed over a period of several years. Friedland (2013) has modeled the intersection of the civic and communication ecologies in a single city, Seattle, finding that there is a clear relation among urban structure and media ecology. Further, this research finds that there is a strong relation between local government investment in community communications infrastructure and the existence of meso-level communication in low-income and minority communities. Friedland and Kim (forthcoming) have written a synopsis of the literature on community communication ecology, with directions for future research. Friedland, Konieczna, and Swanberg (in progress) are conducting a qualitative and quantitative analysis of more than 1,200 cases of hyperlocal reporting in the United States, drawing from data initially gathered by the J-Lab led by Jan Schaffer at American

University, and then expanded in 2010-11 by Friedland and colleagues (for distribution see p. 65 above).

A major tradition in the theoretical and empirical study of contemporary urban communication grows from the research of Sandra Ball-Rokeach at the University of Southern California. Understanding the media ecology of a geographically defined community is a crucial step towards identifying factors that promote or hinder local participation, information dissemination, and collective action. The USC Metamorphosis Project led by Ball-Rokeach has conducted a set of studies employing an ecological approach at the neighborhood level. The group has examined over a dozen ethnic communities located in Los Angeles County. Its research investigates interpersonal and mediated local interactions and their civic outcomes (Kim & Ball-Rokeach, 2006).

The conceptual approach adopted by Metamorphosis provides a versatile framework that operates on multiple levels of analysis, allowing for studies of individual connections to media resources as well as community-level communication ecologies. Research using this approach has employed multi-method designs combining qualitative and quantitative measures.

In a number of theoretical and empirical papers, Ball-Rokeach suggests that media need to be studied in the context of larger social systems incorporating members of the public and local organizations. The individual media ecology of residents is seen as a subset of their total connections to communication resources, which may also be interpersonal or institutional. A central concept used in that research is the *neighborhood storytelling network*: a social system encompassing residents, local media and organizations, as well as the connections between them (Kim, Jung, & Ball-Rokeach, 2006). In the ideal case, micro-level agents (residents) and meso-level agents (news media and local organizations) form an integrated network carrying an uninterrupted flow of information about the community.

The Metamorphosis research team has developed measures capturing the scope of connections between community members and their neighbors, local media, and organizations – as well as a measure of integrated connectedness to the storytelling network. A strong, integrated network is found to enhance several civic outcomes. Those outcomes include *neighborhood belonging*, measuring the attachment of residents to their neighborhood; *civic participation,* or the extent to which individuals are involved in community activities; and *perceived collective efficacy*, or resident perception about the ability of the community to collectively solve local problems. At the community level, those constructs are often assessed through a mix of qualitative and quantitative research. At the individual level, specific survey instruments measuring each concept have been designed and validated. Those tools, along with operationalizations of individual connections to a storytelling network, can be accessed online at www.metaconnects.org/toolkit.

The work of Metamorphosis puts forward the concept of *geo-ethnicity*, referring to the distinctive properties of an ethnic group placed in a given cultural, spatial and temporal context (Kim, Jung, & Ball-Rokeach, 2006). Geo-ethnic media produce content covering a geographic area, and/or focusing on issues relevant to residents of a particular ethnicity. These sources become particularly important as news media face financial problems forcing regional and metropolitan outlets to reduce the scope and depth of their local coverage.

Unfortunately, ethnic media do not always serve the information needs of diverse communities. For instance, examining the content of ethnic newspapers from predominantly

Asian and Latino neighborhoods in Los Angeles, Lin and Song (2006) find that local and regional coverage is much less prominent than international news and stories from the wire services.

A main premise of Ball-Rokeach's work (Ball-Rokeach, Gonzalez, Son & Kligler-Vilenchik, 2012) is that media use is goal-oriented. More generally, individuals are seen as purposefully constructing networks of information resources, selectively establishing connections within a particular communication environment. The goal-oriented nature of media ecologies should also be taken into consideration in the design of policy studies. For instance, research instruments should account for the fact that media serving the critical information needs of a community in the area of health will be different from the ones that are key in the domain of political information. Both of those may also differ from the information and entertainment sources that people report using most often. Some of the recent work of Ball-Rokeach and her team involves the conceptual and methodological development of a goal-specific communication ecology measure.

Another recent project of the group investigates the capacity of new media to enhance civic engagement and intergroup dialogue in diverse communities (Chen, Dong, Ball-Rokeach, Parks & Huang, 2012). Exploring barriers to traditional and online participation in a multi-ethnic study area, the researchers identify typical challenges like the lack of local news and the low levels of intergroup communication, as well as linguistic and social barriers.

A number of non-governmental groups have initiated efforts to map the structure and functioning of local media ecosystems. The New America Foundation, for instance, has been conducting a series of Information Community Case Studies (communities studied thus far include Scranton, PA, Seattle, WA, Washington, DC, Minneapolis-St. Paul, and the North Carolina research triangle; see http://mediapolicy.newamerica.net/information_communities_case_studies). These in-depth assessments of the media ecosystems of individual communities involve the gathering of data on a variety of community characteristics, including: demographics; educational institutions; economic development; broadband deployment; public library resources; print media staffing, circulation, and content; commercial and public broadcasting outlets and their performance; and the availability and content orientation of online news and information sources (both independent and affiliated with traditional media). This gathering of both qualitative and quantitative information provides useful portraits of the state of local media ecosystems and the communities that they serve.

The Knight Foundation (2009) has developed a Community Information Toolkit, which it has piloted in three communities (Philadelphia, PA; Macon, GA; and San Jose, CA). The Community Information Toolkit is particularly notable for the ways in which it outlines the three specific, interconnected elements of a community information ecosystem: a) the supply of news and information in a community; b) individual and institutional skills, including digital literacy and technology and information-seeking skills; and c) information infrastructures, including journalistic organizations, libraries and governmental information sources; and broadband networks. The Toolkit also, importantly, includes a set of specific guidelines on how to define a community along one – or a combination of all three – of the following criteria: a) geography; b) demographics; and c) issues of interest. Given that the Toolkit is intended to be actionable at the local level via local community groups, the data gathering criteria are fairly simple and likely don't rise to the level that is ideal for policy analysis. So, for example, the empirical backbone of the Community Information Toolkit is something called the Community Information Scorecard which primarily involves the answering of a series of "yes" or "no" questions about the media/information environment in a local community (e.g., "Is information about renewing your driver's license available online?"), as well as some more detailed questions (e.g., percent of community broadband coverage; public libraries per capita; publicly available WiFi hotspots per capita; number of local newspapers; number TV stations providing local news, etc.). Certainly, many of the questions needing to be answered to implement the Toolkit may be directed at a level that's a bit too superficial for policymaking, the Toolkit provides a potentially useful conceptual and analytical baseline for developing a more robust scorecard, of sorts, for assessing the media ecosystems of individual communities and the extent to which communities' critical information needs are being met.

Some similar efforts to assess the health of local media ecosystems have developed within the academic literature. For instance, Lowrey, et al. (2008) draw upon a thorough review and synthesis of the literature on community journalism to develop a "multi-item summated scale to measure the degree to which media outlets aid community" (p. 275). They present a range of criteria, based on their review of the literature that could be incorporated into future efforts to assess the extent to which media outlets are serving the critical information needs of their communities. Their proposed scale has a number of components. These include: a) Community Structure (involving the assessment of criteria such as provision of mobilizing information; facilitating social and civic engagement); b) Listening/Pluralism (involving the assessment of criteria such as researching and obtaining feedback from local communities; framing of news stories); c) Leading/Cohesiveness (involving the assessment of criteria such as the provision of "problem-solving" information). The authors also offer some preliminary suggestions regarding how to translate these criteria into concrete measures, though at a fairly general level. Thus, this project clearly represents a fairly basic first step in what is presumably a larger, more complete project to be undertaken. In the interim, however, this study does provide some useful criteria that could potentially be employed in developing tools for assessing the extent to which individual media outlets are serving their communities' critical information needs, in ways that go beyond the specifics of the subject matter that is delivered, and instead address the processes and techniques surrounding the delivery of this information.

Research by Jeffres, et al. (2009) assesses community diversity and its relationship to a range of journalistic goals within a sample of local urban newspapers. They find that the greater the ethnic diversity of the surrounding community, the greater the extent to which the editors of local urban papers emphasize the importance of civic journalism and activity. They also find that greater lifecycle diversity (diversity in terms of age, household size, and marital status) positively related to editors' expressed commitment to coverage of ethnic communities and social services; as well as to civic journalism and activity. To the extent that a study such as this simultaneously attempts to map the characteristics of a local community against the characteristics of the information provided to that community, it offers an important example of how the notion of a media ecosystem can be operationalized at a local level. In this case, the extent to which the local papers fulfilled their communities' critical information needs was assessed in terms of the expressed levels of commitment of newspaper editors – a fairly indirect approach that can be seen as a positive or a negative depending upon one's perspective on the appropriateness of more rigorous content analysis in the assessment of the performance of local media ecosystems.

Economic Methods

There is a substantial body of economic literature that has sought to explain the dynamics surrounding the provision of community information. As this work has clearly demonstrated, one of the defining characteristics of news and information is its susceptibility to under-provision, given its public good characteristics, and given the two-sided nature of media markets – and thus the influential role in the production process played by advertiser demand for audiences (Hamilton, 2004). The economic analysis of media markets has offered various perspectives on the relationship between media market structure and media performance, addressing issues such as the relationship between market and ownership conditions and a variety of performance metrics, such as diversity, quality, political bias, and localism (see, e.g., Adilov, Alexander, & Brown, 2007; Alexander & Brown , 2004; Crawford, 2007; George, 2007; Roger, 2009; Shiman, 2007). For this section, however, the focus is primarily on issues of methodology, rather than specific findings.

A key issue that this literature has sought to address involves the difficulties associated with effectively defining the parameters of individual media markets, given the multi-revenue stream model characteristic of two-sided markets and given the difficulties associated with clearly demarcating substitutability across different media platforms and content types (Waldfogel, 2002). This work has proven that both product and geographic delineations of media markets can be somewhat opaque. For instance, George and Waldfogel (2006) have shown that national level media content providers (such as the *New York Times*) can negatively impact consumer demand for local news and information sources. Similarly, George (2006) has shown that Internet penetration can negatively impact local newspaper readership among some demographic groups. Such relationships highlight important complications and inter-relationships that affect the structure and operation of local media systems. Such work provides an essential foundation for building a deeper and more comprehensive understanding of the inter-relationships between different platforms and outlets in contemporary local media ecosystems.

This work has also established important empirical and methodological foundations for understanding of the impact on various structural and performance characteristics of media markets and certain political outcomes (such as voting) that are at the core of the functioning of any local media ecosystem. Research in this vein has engaged in innovative linkages between various forms of media economic data (revenues, circulation figures, audience ratings) and various forms of political participation data (e.g., voting records). Oberholzer-Gee and Waldfogel (2009), for instance, use such data integration to demonstrate that the degree of availability of Spanish-language news content positively impacts the degree of Hispanic voter turnout in individual communities. Similarly, George and Waldfogel (2002) show that the penetration of national news sources (such as the *New York Times*) can negatively impact not only local media consumption, but also (by association) participation in local elections. By simultaneously examining media market structure/content and political activity in local communities, such research has contributed valuable insights into the dynamics of local media ecosystems..

Economic analysis has also been employed to develop generalizable assessment tools for determining the structural diversity of local media ecosystems (see, e.g., Bush & Zimmerman, 2009). Perhaps the most significant of these is the FCC's Diversity Index (DI). The DI was crafted as a modified form of the Herfindahl-Hirschman Index that could be applied to local media markets, to be used primarily within the context of assessing the need for media ownership regulations. Although media ownership is only part of a much broader analytical frame than is being applied here, it is important to recognize that the media ownership issue has inspired a number of significant analytical approaches that a have a direct bearing on – and significant value to – any future efforts to robustly assess the extent to which local media ecologies are meeting the critical information needs of communities (see Napoli & Gillis, 2006).

It is unnecessary to recount the methodological specifics of the DI or the controversies that resulted from its introduction here (for a discussion of these issues, see Marcus, 2007; Napoli, in press-a). Rather, the focus here will be on some of the DI's analytical dimensions that are most relevant to the present analysis; as well as on the relevant subsequent research that the DI inspired.

From an analytical standpoint, it is particularly important that the DI sought to account for the distinctive role that different media platforms play specifically in the delivery of local news and public affairs – which can be seen as a core content type that addresses critical information needs in a community. As the Commission stated in its June 2003 Report and Order: "We find that viewpoint diversity is most easily measured through news and public affairs programming. Not only is news programming more easily measured than other types of content containing viewpoints, but it relates most directly to the Commission's core policy objective of facilitating robust democratic discourse in the media" (p. 13631). In this case, each platform's news and public affairs contributions were assessed on the basis of consumer's expressed reliance on each of them for local news and information.

In this regard, it also is important to emphasize that the measurement of local news and public affairs content did not factor into the calculation of the DI. Rather, in order to differentiate the significance of different media platforms, the Commission utilized a consumer survey in which respondents identified the extent to which they rely on different media types for such information. The Commission elected not to integrate a more rigorous content element into its Diversity Index, due to "both legal/Constitutional and data collection problems" (Federal Communications Commission, 2003, p. 13787). Such concerns remain relevant today in any future effort to rigorously assess local media ecosystems in ways that can inform policymaking. The key point here is that, regardless of methodological approach, differentiating the varying contributes of different media sources to the fulfillment of a community's critical information needs has an established precedent in media policy analysis.

Although the application of the FCC's DI was discontinued in the wake of the *Prometheus Radio Project v. FCC decision* (2004) (for a discussion of this decision, see Napoli & Gillis, 2006), it is also important to note the extent to which the DI inspired a substantial amount of subsequent research that also can meaningfully inform future efforts at assessing local media ecosystems. The most immediate effect was the substantial amount of scholarship it inspired that sought to develop alternative or enhanced versions of the Index (see, e.g., Hill, 2006; Lloyd & Napoli, 2007; Noam, 2009). In some cases, these efforts proposed slight modifications to the Commission's Index. In other cases these efforts involved complete reimagining of how to measure diversity in local media markets. In any case, the notion of applying a quantitative index to the concept of diversity in local media markets clearly took hold in academic communications policy research.

Eli Noam (2009), for instance, in an effort to better accounts for not only media market power but also media pluralism, developed and applied an index that (like the FCC's DI) starts with the traditional HHI, but then divides it by the square root of the number of voices in the market. Noam (2009) also employs a one percent audience reach threshold in the counting of voices in a local media market. Hill (2006) offered a similar modification to the DI – one that was again focused on the calculation process rather than on the underlying data gathering. This proposal involved replacing the DI/HHI process of summing the squared market shares of each owner in a market with a summing of the square roots of these market shares.

Other efforts to build upon the FCC's DI went beyond the calculation process to also address the nature of the underlying data. Lloyd and Napoli (2007) proposed an approach that incorporated additional data such as the quantity and demographic make-up of news workers employed by individual media outlets and the percentage of a media outlet's content devoted to local news. These more qualitative dimensions of media outlet performance would then be used to weight the contribution of each media outlet to the final diversity calculus; and were meant to do so in such a way as to reflect, at the general level (via the size and composition of their news staffs), the extent to which individual media outlets were dedicated to serving the critical information needs of their communities. Subervi and Correa (2008) implemented this methodology in a study Latino-oriented broadcast media in Central Texas, with result that, according to the authors, indicated insufficient levels of diversity in the markets studied.

From a methodological standpoint, there are a number of generalizable issues that have been raised in regards to this body of literature that can be useful in terms of building upon it going forward. The first is that it has frequently proven to be the case that many of the key forms of economic data that have fed into these analysis (circulation figures, audience ratings, revenues, etc.) are often derived from data sets that have significant gaps, particularly when the data are being used to try to develop comprehensive economic profiles of local media ecosystems (see Napoli & Karaganis, 2007). Second, the analyses of different dimensions of media content have been integrated into this body of literature often have been executed in ways that have been criticized for not meeting the levels of rigor that have been developed in other areas of the social sciences in which content analysis is a more central methodological component (see Fico, Lacy, & Riffe, 2008). Third, the extent to which some of this research goes beyond the dynamics of content production and distribution to also take into consideration the dynamics of media consumption, this research highlights a broader methodological and normative question regarding the extent to which policymaking and policy analysis should go beyond the availability of relevant news and information and also address media consumption and usage dynamics. In any case, the development and application of an agreed-upon accurate and reliable summary measure of the unique complexities of media market structure is a vital component of any comprehensive effort to assess the functioning of local media ecosystems.

Content Analysis

Perhaps the most common content analytic approach to measuring whether communities' critical information needs are being met has been the substantial body of research that has assessed the extent to which local news sources (such as broadcasters and newspapers) are providing local informational content. The findings of this body of research are varied, and are discussed in detail in Section 2. The focus here, however, is on key methodological approaches taken in this body of research. Generally, this work can be divided into two methodological categories: a) research that has relied upon fairly general content categorizations; and b) research that has engaged in more rigorous assessment of various qualitative dimensions of local informational content.

Looking at the first category, there is a substantial body of research that has focused on the overall quantities of local informational programming provided by local broadcast stations (see, e.g., Napoli, 2001; Singleton & Rockwell, 2003). Typically, the assessment of the quantity of such programming available is derived from local program schedules or from commercial databases (such as TNS Media Services) that provide the underlying program data for electronic program guides. Much of this research has been conducted in an effort to answer questions associated with media ownership regulation; such as whether local media ownership concentration, or other market conditions, affect the quantity or quality of local informational programming; or whether certain types of owners (minority owners, local owners, conglomerates, etc.) demonstrate different levels of commitment to local informational programming (see, e.g., Napoli, 2000; 2004; Napoli & Yan, 2007; Spavins, et al., 2002; Yan & Park, 2009).

As noted above, there has also been a substantial amount of research that has provided more in-depth content analyses of various dimensions of local informational content. In this second category of research, there has been a particular emphasis on local political coverage on broadcast stations, in an effort to determine the extent to which local stations are providing the type of information (in terms of quantity and/or diversity) that policymakers frequently have asserted is central to the critical information needs of communities (see, e.g., Fowler, Goldstein, Hale, & Kaplan, 2007; Kaplan & Hale, 2000, 2001; Kaplan, Goldstein, & Hale, 2005).

There has also been a fairly significant amount of content analysis research that has examined more general aspects of local informational content, such as the extent to which the content addresses genuinely local issues (Alexander & Brown, 2004; Scott, et al., 2008; Yanich, 2010); focuses on "hard" news versus "soft" news (Kaplan & Hale, 2010); covers city government (Baldwin, et al., 2010); represents resource-intensive types of reporting such as enterprise reporting (Smith, 2009); or represents a diverse range of ideas, issues, and viewpoints (George & Oberholzer-Gee, 2011; Smith, 2009; Voakes, et al., 1996). Again, much of this research has been motivated by questions about the effects of media ownership regulations, as well as by emerging concerns such as the rise of shared service agreements among local broadcast stations (Yanich, 2011).

These various strands of content analysis have employed a number of different methodological approaches, ranging from the analysis and categorization of individual stories obtained from news recordings (e.g., Fowler, et al., 2007), to the analysis and categorization of the names of political office holders as obtained from local news transcripts, as a means of determining the diversity of political coverage within and across local newscasts (George & Oberholzer-Gee, 2011), to the analysis and categorization of television and radio content via the materials made available on the web sites of these media outlets (Baldwin, et al., 2010). These different methodological approaches are reflective of the ongoing challenges to obtaining representative samples of content across different media platforms and across multiple markets. Some media forms (newspapers, for example) have reasonably thorough content archives that can be accessed by researchers; whereas others (radio and online information sources, in particular), are particularly lacking in thorough content archives. Local television seem to fall into something of an intermediate position, with useful content archives available, though with somewhat spotty coverage.

A recent study by the Project for Excellence in Journalism (Rosenstiel & Mitchell, 2011) moved the analytical focus online, providing a content analysis of how mainstream media outlets use Twitter. The study focused on 37 different Twitter feeds across 13 different major U.S. news outlets. Individual tweets were then content analyzed according to a variety of criteria, including the story topic associated with the tweet; the geographic focus of the tweet/story; whether the tweet was a re-tweet; and whether the tweet sought audience feedback of any kind. Although this study focused primarily on national news sources; it is significant from a methodological standpoint in that it represents an analytical focus that is easily adaptable to the local level.

As should be clear, the bulk of the research to date has focused on local television and, to a lesser extent, local newspapers. However, some of the research in this vein has begun to provide a valuable cross-platform comparative approach. Carpenter (2010) employed content analysis to compare online content diversity across citizen journalism sites and traditional newspapers' online platforms. This work is of interest particularly for its effort to transition the analysis of content diversity to the online realm. Obviously, such diversity is an important mechanism by which the full range of a community's critical information needs are served. In this case, content diversity was operationalized primarily in terms of the range of news topics; though only four topic areas were incorporated into the measurement instrument (crime, business/economy, entertainment, government), which is a somewhat superficial indicator of the extent to which the diversity of a community's critical information needs is being served.

The Project for Excellence in Journalism (2010) has conducted an analysis of the proportion of total stories accounted for by different story types (science, health, celebrity, economy, etc.) across multiple information platforms, including traditional television and print news sources; Twitter, YouTube, and blogs, in an effort to determine if and to what extent different platforms are addressing different aspects of audiences' critical information needs. The analytical scope for this research is more national than local; but once again this appears to be an instance in which there might be some general methodological elements that could inform more locally-focused research. This project also draws upon the PEJ's News Coverage Index and New Media Index – two systematic and regularly updated content archives that (in the case of the News Coverage Index) may offer some robust local-level news media data to facilitate the analysis of certain local media ecosystems, or (in the case of both indices) may offer some methodological guidance in the crafting of similar indices for local media ecosystem analysis.

It is important to emphasize that, while there has been a substantial amount of content analysis-based research directed at the information provided to local media ecosystems, relatively little of this research has focused on *mapping the flow* of information through these systems, which is a key element of the functioning of contemporary local media ecosystems. Perhaps one of the most significant efforts to tackle this issue thus far has been the Project for Excellence in Journalism's (2010) "How News Happens" study, which focused on the production and flow of local news within the city of Baltimore (also discussed in Section 3). This research was guided by the fundamental question, "How does the news 'ecosystem' of a large American city work?" (Project for Excellence in Journalism, 2010, p. 1). This question obviously is of direct relevance to the issues being addressed here.

Methodologically, the PEJ study is a case study of one city; but one that draws heavily upon content analysis. The starting point for the study was the identification of "news produced by every local news operation we could identify in the city—from radio talk shows, to blogs, specialized new outlets, new media sites, TV stations, radio news programs, newspapers and their various legacy media websites" (Project for Excellence in Journalism, 2010, p. 4). The authors ultimately identified 53 distinct local news outlets (though the study is a bit imprecise in its definition of a news outlet -- as in some instances individual programs are treated as outlets); and tracked every piece of content produced by those outlets for a three day period. The authors also conducted a deeper analysis of six major stories from that week to determine which news outlets were contributing additional information; and to determine what additional "relay" outlets might be significant in the ecosystem (see Section 3).

Both the findings and methodology of this study are of particular significance to the issues being addressed here. The findings are important as they point to the continued centrality of traditional news media as the generators of the information that serves the critical information needs of local communities – and thus the continued need to include such media in any empirical assessment of local media ecosystems. The findings also highlight the need for future research to differentiate between the production and the dissemination/publicizing of news and information at the local level. From a methodological standpoint, this study offers an interesting baseline from which to consider the design of future research into the flow of information within communities. Scalability is obviously a major source of concern, both in terms of geography (i.e., the analysis of multiple local media ecosystems), and in terms of the scope of the news and information subjected to analysis (both in terms of timeframe and in terms of subject matter).

These latter issues point to some of the main challenges associated with conducting content analysis at the scale necessary to effectively inform policymaking. Some of these challenges have become magnified as the Web has emerged as a means by which local news and information is disseminated and consumed. If or how such a seemingly vast universe of content can be meaningfully and reliably incorporated into a policy-relevant assessment system has been a common point of discussion. Dwyer and Martin (2010), for instance, identify methodological challenges such as effectively accounting for the presence (and impact) of individual authorship (i.e., blogs, etc.) in the online space, as well as the impact of intermediaries such as search engines and content aggregators.

Some researchers have begun to explore the potential for automated or computer-assisted content analyses methods for online content, and have outlined a thorough set of recommended procedures for such an approach (see, e.g., Slovak & Starveling, 2012). Slovak and Starveling (2012), for instance, illustrate how text-based content analysis of online news outlets can be conducted via focusing not on the text of the stories, but essentially on the text of the metadata (markup language, URL) associated with individual stories. As the authors note, this is an approach to content analysis that is fundamentally different from traditional approaches, and one that reflects the unique characteristics of the medium being analyzed.

Case Studies

Given the complexity of contemporary local media ecosystems, it is not surprising that a variety of case study approaches have been employed to try to develop a detailed understanding of how critical information is being produced in local communities; how that information flows through these communities; and how that information is being used. For instance, a recent white paper sponsored by the Knight Foundation as part of their follow-up work to the Foundation's Information Needs of Communities report, focused on the process of reimagining journalism in local communities (Fancier, 2011). This report included a detailed case study of the state of the

Seattle, WA media ecosystem, with a particular emphasis on the environmental changes that were affecting the quantity, structure, and behavior of local information sources.

Some case studies have focused on specific aspects of local media ecosystems. Kurpius, Metzger, and Rowley (2011), for instance, for instance, conducted case studies on 10 hyperlocal news operations in six states. The authors focus, in particular, on the funding models that have merged in these hyperlocal media operations and whether they appear to be sustainable over the long term. As these case studies illustrate, non-commercial funding mechanisms are becoming an increasingly significant component of contemporary local media ecosystems, which highlights the fact that future research efforts need to effectively account for both the commercial and non-commercial media sectors, as well as the many "informal" media economies that are operating at the local level.

The most extensive and detailed case study work thus far has come from the Open Society Institute, which has commissioned a growing series of over 50 national-level case studies, under the heading "Mapping Digital Media" (http://www.soros.org/issues/media-information). While the unit of analysis for these case studies is the individual country, rather than the local level media ecosystems that are the focus of this review, this project merits discussion from the standpoint of the range of criteria that that the Mapping Digital Media reports address – many of which can be translated to a more local level. Both quantitative and qualitative data are gathered and critically assessed from a wide range of sources and on a variety of subject areas, including: economic and demographic characteristics; digital and traditional media infrastructure and device penetration; media usage patterns; audience ratings/circulation figures; government media regulation and support; journalistic resources and activities; and media ownership and competition.

Examination of the critical information needs of local communities would benefit greatly from a series of rigorous extended case studies in a comparative framework (see Comparative Methods below). The most important use of case studies (combining other methods) is for "typing" both the classes of individual and group information users and patterns in a given community and for typing communities themselves. More formally, typing means establishing classes of sets that can be used in more formal comparison. So, for example, it may be that that in a given community, for example Los Angeles, the category (or type) of "immigrant" is way to broad to capture the real nuanced differences across communities. Depth exploration of immigrants would find (and has in the Metamorphosis Project) real differences between recent arrivals and first generations, regardless of ethnic communities. But even here, we would find differences among those immigrants who are still heavily attuned to information about their country of origin as a primary reference, and those who focus more on their communities of residence. There are significant differences across ethnic orientations towards information, and these are more likely to be identified in case studies using qualitative research. Other methods (e.g. content analysis, social network methods) allow us to construct patterns of information flow within and between communities, and in the larger metropolitan region, leading to a more complete understanding of the relations between information and media and community structure.

Social Network Methods

Network analysis provides a powerful approach to the systematic study of local media ecologies. It enables the tracking of information flows through interpersonal and media channels, allowing researchers to identify key communication resources, challenges, and bottlenecks. Network studies are used to investigate the practices of media organizations, as well as individual and group content consumption patterns. As Castells (2009) points out, relational thinking and measures are particularly important in the context of a media industry moving to networked forms of organization.

Studies of critical information needs (and the extent to which the media system fulfills those needs) should be sensitive to the industry-wide trends towards consolidation, collaboration, local and global partnerships. The media sector consists of increasingly dense inter-organizational networks defined by links of ownership, market exchanges, strategic alliances, joint political action, interlocking directorates, and shared human resources. In one study exploring those patterns, Arsenault and Castells (2008) track the networked organization of transnational media conglomerates. Their work investigates a system of partnerships, cross-investments, and personnel ties among media corporations and Internet companies. Arsenault and Castells (2008) highlight the impact of these structures on regional/local markets and content production. Capturing and analyzing inter-organizational relations at the local level provides one way of measuring the impact of ownership on content diversity - and on the scope of critical information available through the local media ecology.

Network metrics can also be used to track the connections between individuals and information resources. As discussed above, the Metamorphosis research team lead by Ball-Rokeach provides one example of this analytical approach. Using multi-method research, the group examines a set of community-level networks encompassing local media, residents, and organizations. Their findings suggest that better-integrated and more diverse connections are needed to facilitate the flow of information within the community (Kim & Ball-Rokeach, 2006).

As Web platforms become key sources of news for the American public, the network perspective is extending to the study of digital spaces. Efforts to understand the structure and functioning of local media ecosystems via online methods, however, are still in their infancy. Yardi and boyd (2010) for example examine the flow of information on Twitter within two geographic communities, via the analysis of the tweets that emanated around specific events that occurred within these communities. The authors are primarily concerned with comparing the network characteristics (such as density and centrality) of local networks to non-local networks; though their findings also illustrate the increasingly important role that social media can play in the dissemination of critical local news and information. According to other reports (Purcell, et al., 2010), more than half of the people using social networking sites receive and read news items through those platforms on a daily basis. A more detailed analysis of these dynamics could play a valuable role in future efforts to assess the full scope of social media platforms' contributions to local media ecosystems.

Another set of methods used to track online information flows examines linking patterns on the web. The volume and structure of hyperlinks are used to identify key online resources. Based on link structure, network algorithms can measure the relevance of online content within a specific knowledge domain (Easley & Kleinberg, 2010). Hyperlink studies such as the one conducted by Meres (2009) indicate that even online, mainstream media are still the most prominent source of news and information. Similarly, the Pew Project for Excellence in

Journalism (2010) reports that more than 99% of the news stories linked to by bloggers come from traditional media.

Network methods can be employed, broadly, at three levels in the analysis of community information needs. At the level of social structure (see work of Ball-Rokeach, Friedland, Hampton in bibliography) network methods offer a more precise means of understanding the individual or "personal" network patterns that allow people to move between interpersonal communication and mediated communication. So Hampton's studies of weak tie structures, or Ball-Rokeach's story telling neighborhood, illuminate how people navigate networked information as individuals or small groups. Media also connect individuals and groups through networked patterns of information sharing, as in, for example, Friedland et. al. study of the local media ecology of educational issues. By connecting media institutions (legacy and new) with sources, sources with community networks, and then media content with these media/community networks we can see larger patterns of information flow throughout a community. Sometimes where there are tightly connected hubs, which facilitate communication; at other times these hubs function as bottlenecks. Finally, network analysis can help us see broader ownership patterns and to potentially link the effects of ownership to community information needs at lower levels.

Comparative and Mixed Methods

Comparative methods in the social sciences are an important tool for organizing the comparative analysis of community communication ecologies systematically. Qualitative Comparative Analysis (QCA) developed by Charles Ragin in sociology and political science (1987, 2010) employs a Boolean algebraic method to systematically compare *configurations of cases* across what has become known as "mid-N" research, numbers of cases larger than qualitative research (the single or few in-depth cases) and smaller than the number of cases necessary for quantitative analysis. It should be stressed that QCA is not simply a lesser method when sufficient power can't be generated for statistics. Rather, it is a method for analyzing the necessity and sufficiency of variable configurations across cases, such that, for example, we can infer that successful hyperlocal online news sites at the meso-level need an adequate newspaper environment to cross neighborhood boundaries. QCA does this using a Boolean algebra, and has been incorporated into the widely used open source statistical package R.

The use of QCA is potentially important in the study of the CINC. It allows us to take "mid-N" clusters of cases (approximately from 10-50) and systematically explore how these sets of whole cases vary by configuration and outcome. For example, a given set of ten cases might include cities with stronger or weaker economies, strong or weaker newspapers, television stations that report more or less quality local news, meso-level online media that report on community information needs and those that don't, the degree of connection across these different levels (e.g. do newspapers actively collaborate with meso-level media), as well as some indices of racial and ethnic diversity, immigration, degree of spatial dispersion, etc. The Boolean algebra of QCA can factor out the variables (in this case type variables) understood as either binary (e.g. strong or weak newspaper) or ordinal (degree of strength), to begin to see patterns of factors that lead to the meeting of community information needs. This method is both exploratory and rigorous, allowing us to understand, for example, why Seattle is more like Minneapolis and less like LA, or where LA and Phoenix differ, despite some demographic similarities. QCA is a way of exploring these differences where large N research that would allow quantitative generalization across cities is not possible (e.g. for lack of data). But is also a middle route for sharpening and formulating hypotheses, both theoretical and analytical. Friedland, Konieczna, and Swanberg (in progress) are currently applying this method to the analysis of cases of hyperlocal journalism, which might have implications for the design of pilot studies that can systematically compare whole community communication ecologies.

There is a growing trend in the social sciences toward "mixed methods" studies systematically reviewed by Small (2011) in the *Annual Review of Sociology*. Small characterizes the trend as consisting of primarily two forms of studies: those that combine two or more types of data (qualitative, quantitative, network, comparative); and those that combine two or more analytic strategies, for example examining qualitative data with quantitative methods or exploring quantitative data with qualitative methods. These studies are also, increasingly using computer methods of semantic analysis that promise to automate content analysis in media ecological analysis. Gad, Ramakrishnan, Hampton, Kavanaugh (2011) conducted a remarkable analysis of differences in community wide deliberation in multiple online conversations in Philadelphia which sought to identify whether there are more or less common interests between communities with different poverty levels, which employs a novel time series algorithm to segment and analyze community conversations, which was then applied to six communities across the U.S. The results demonstrate that advanced semantic analysis algorithms can be used to analyze community information needs at the neighborhood and comparative levels, without the burden of traditional content analytic methods. This is a promising method to which we return in our recommendations for study design.

Indices

Finally, we discuss several indices, measures, and databases that are relevant to our recommendations for the construction of a research design. One large-scale empirical project that merits discussion, despite the fact that it is not focused on the U.S., is the European Union's *Indicators for Media Pluralism in the Member States* (Valcke, et al., 2009). Like some of the other material addressed in this section, this research is oriented at the national, rather than the local level. Nonetheless, from a methodological standpoint there may be useful strategies and tactics contained within this analysis that could be employed for analyses conducted at a more localized level. Of particular importance is the extent to which the Media Pluralism Monitor looked beyond ownership and sought to account – both quantitatively and qualitatively, for a variety of relevant indicators of a truly pluralistic media system. These include:

a) *legal indicators*, including the presence or absence of legal structures to protect/promote freedom of speech, journalistic practice, freedom of information, access to official information, diversity of media ownership, diversity of viewpoints and content types, alternative, minority-targeted, community, and public service media, broadband access, and media literacy. Many of these criteria (diversity of ownership/viewpoints; availability of alternative/minority/targeted/community/public service media) are easily translatable to a more localized unit of analysis.

b) *Socio-demographic indicators*, including the extent to which public service media are engaged with new media; the extent to which online media platforms support public participation; the extent to which journalistic coverage is overtly politicized; the extent to which political entities are capable of influencing media outlets; the extent to which media workforces, media outlets, and media content are culturally diverse and address the needs of minority groups; the extent of centralization of national and local media systems; and the extent to which citizens and citizens groups engage in online political activity. Again, the analysis of many of these criteria can easily be translated to a more local level. Indeed, this review has discussed literature that engages in the analysis of some of these criteria (workforce and content diversity; content addressing minority interests) at the local level.

c) *Political-economic indicators*, including concentration of ownership and levels of competition in content production; distribution and advertising arenas; the number and financial performance of media outlets in various platforms; subsidy levels for public service and alternative media; and supply levels for news and public affairs content. Once more, such national level analytical concepts are easily translatable to the local level, with many of these constructs already having been analyzed at the level of local media markets (e.g., financial performance of media outlets, public subsidies, supply of local news and public affairs).

The Media Pluralism Monitor may represent the most wide-ranging and ambitious effort yet by a governmental entity to assess the structure and performance of a media system. Clearly, the MPM is quite comprehensive in terms of the range of relevant factors that are taken into consideration in order to assess the health of a (national) media ecosystem. The assessment approach takes into account traditional concerns regarding the structure and ownership patterns in media markets, the supply of local news and public affairs content, and the diversity of content types. It also takes into account criteria that are increasingly important in the digital age, such as media literacy, and the extent to which online platforms support public participation.

As might be expected of a research enterprise that establishes an analytical scope of such breadth and complexity, it is often the case that the operationalization of many of these criteria into concrete measures has, by necessity, been executed in a fairly simplistic way. Thus, for instance, many of the assessment criteria are derived from a set of Yes or No answers to some reasonably subjective questions. The assessment also employs some fairly broad and superficial content categories in the overall assessment of individual media platforms as well as a fairly limited scope in the sampling of relevant outlets for such analysis. But such are the perhaps inevitable methodological trade-offs when large-scale, comprehensive assessments of media ecosystems are implemented under tight time and budget constraints. In any case, the Media Pluralism Monitor offers a potentially useful point of reference for the development of a multi-faceted index that allows for the comparative analysis of different local media systems.

There are also a number of existing indices and associated databases that are relevant to any potential large-scale analysis of the functioning of local media ecosystems. For example Lewis and Burd-Sharps (2010), *The Measure of America,* developed by the Social Science Research Council, offers a high quality set of validated indices, based on the U.S. Census and ACS that can serve as pattern and model for the anchoring of indices measuring community information needs. *Measure of America* develops indices of health, access to knowledge, and living standards that can be adapted to correspond to our CIN in these areas, and extended to others. For a methodological notes on its development, see pp. 204-211.

The Urban Institute has developed a set of data indicators, “Metrotrends” for the top 100 metropolitan areas (where approximately 82% of the U.S. population lives). The indices include measures of arts and culture, crime, demographics, economic output, education, employment, food insecurity, health insurance, nonprofits, housing, unemployment and wages. Further, these have been developed into a National Neighborhood Indicators Project in 36 metro areas, which would allow the coupling of macro-modeling with neighborhood modeling without investing in new data collection.

There are also existing tools available that could facilitate co-modeling standard metropolitan statistical areas (SMSAS) and DMAs. For instance, the Community Analyst Data package available from ESRI contains 8755 variables, including neighborhood and lifestyle data, and allows GIS analysis down to the census block level. For an example of how this might be used see MacDonald and Peters (2011) *Urban Policy and the Census.*

Finally, the Nielsen *Claritas* data on lifestyles, and the ComScore data on local digital media usage can be used to supplement data modeling on local media ecologies. Similarly, the Simmons data polls 500,000 Americans four times annually on a broad array of lifestyle issues. All can be licensed for academic use.

The variables available in these sources could be used in a number of ways in the study of CINC. At the most basic level, the Census and ACS allow the characterization of communities by age, sex, race, family relationships, income and benefits, health insurance, education, disability, place of work and transportation, and residence and cost of essentials. These demographic profiles are the baseline underlying any possible comparison of communities for the purpose of evaluation. The additional indices in Metrotrends (arts and culture, crime, overall economic output, nonprofits, etc.) allow us to build on top of the basic demographic profile to understand the degree of civic and community engagement, as well as the extent to which neighborhoods differ in how they meet basic needs. The lifestyle data from ESRI, Claritas, ComScore and others contains significant media use, consumption, and other variables of association (e.g. do you know your neighbor?) that can further built indices of social capital. I

In sum, multiple extant data sources and indices are available to create robust, valid, models of the macro- and meso-communication ecologies of local communities that would yield valid comparisons once a proper model has been developed.

Summary of Metrics and Methodologies

As this section has illustrated, a number of potentially relevant analytical approaches have been employed to analyze media ecosystems. A number of these have thus far been applied primarily at the national level; they often appear to have the potential to be adapted to the analysis of more localized communities. It has also been the case that those analyses generating the most in-depth information have often achieved this via methodological approaches that are quite narrowly focused in terms of the number of communities analyzed. This of course raises the question of if/how such analytical approaches might be calibrated to a sufficient scale to better inform policymaking, given limitations in available resources. Finally, this review has also pointed to a number of existing data sources that have been compiled for other large-scale research projects that could prove useful in the design and implementation of future research examining the structure and functioning of local media ecosystems.

VI. Recommendations

This critical review and assessment of the wide-ranging literature on community information needs, barriers to participation in media content production distribution, and analytical approaches to understanding local media ecosystems, has led to the following recommendations:

1) The proliferation of new media technologies, the relative market share decline of legacy media, turbulent economic changes and the acceleration of community diversification have created new barriers to Americans' abilities to fully meet their information needs. We, therefore, recommend the FCC devote greater attention to these barriers and to opportunities as part of their statutory mission. Barriers range from insufficient broadband penetration, under-representation of some groups in media ownership and –equally important-employment, to insufficient media literacy by citizens in disadvantaged groups, among others.

2) Reference categories such as "minorities" no longer adequately reflect the pluralistic demographic and socio-economic shifts in the United States, nor does "one size fit all." At the very least, policy researchers must take into account variations within communities and specific populations in identifying and designing responses to critical information needs.

3) Regulators should recognize that the costs of network exclusion are borne not only by the excluded, but also by the society at large, and increase exponentially with the continued growth and expansion of information and communication networks in society.

4) Policy-relevant research must capture the increasingly complex functioning of local media systems in ways that fully account for the role played by *all* relevant stakeholders; the participation and service of the needs and interests of a broad range of minority/under-represented groups; the interconnections and interdependencies that exist among media platforms that embed the analysis of media systems within the analysis of the ways different kinds of local communities actually function; and the extent to which local community information needs are being effectively served.

5) The traditional approach of large-N economistic analyses of media competitiveness do not fully capture the extensive range of relevant factors in America's emerging digital, distributed media ecosystem, and should be complemented by additional analytic models such as a communication ecological approach (see below).

6) Future research should develop and implement a multi-level analytical framework that could be employed in assessing local communities, and the extent to which barriers to participation are affecting the extent to which their critical information needs are being met. It should

   a) seek to understand the emerging patterns of information production, distribution, and consumption that are developing both within and across media platforms (both traditional and new media platforms);

   b) explore these patterns from both economic and non-economic perspectives (given the rise of many "informal" media economies and the increasing prominence of various forms of user generated content); and

c) supplement traditional large-scale quantitative approaches with policy-relevant, methodologically-integrated approaches that can drill down into the complexities surrounding the questions of if and how local community information needs are being served and whether any barriers exist to the fulfillment of these information needs.

7) A model of research rooted in the communication ecology approach can and should be developed, fully incorporating the relevant research problems and methods indicated by the other approaches reviewed. This model should be valid, replicable, and parsimonious, building on a foundation of existing demographic models and data, and incorporating a range of media measures, including surveys, content analysis, social network analysis, and qualitative research. It should unite the range of approaches as much as possible and avoid methods that are outmoded. This is true of both surveys that rely on polling rather than social scientific techniques, and outmoded models of content analysis.

8) Developing robust and testable indicators of performance will be essential, both for the purpose of internal evaluation, and in order to allow policymakers and communities to independently evaluate the overall effectiveness of approaches to meeting community information needs in order to improve community performance where indicated. Multi-leveling modeling survey research and social network analysis, and others that can yield a valid set of comparisons among communities.

The central task going forward, then, is to build a systematic framework for investigation that can meet the needs of the FCC for *rigorous comparability*, *parsimony*, and *economy*. The first standard demands that cases be selected in a way that allows policy makers to compare media environments on secure grounds. Consider, for instance, the comparison of the communication ecologies of large metropolitan areas that share these characteristics: extensive and separate community areas; large minority populations (some of whom are concentrated in specific neighborhoods); a relatively robust newspaper; and moderate hyperlocal activity (none of which addresses minority information needs). When engaging in such comparisons, we need secure grounds for knowing why Los Angeles more resembles Phoenix than Atlanta. Parsimony requires that we make these comparisons with known, high quality data sources, ideally, where possible, the U.S. Census and the American Community Survey, and, further, that we do so in a valid, tested, and replicable model that need not be reinvented for every metropolis. This, of course, leads to economy: the principle that funds are limited and more important, staff time to analyze results is restricted. By building on available data and expertise as outlined in this report and focusing on the most critical knowledge gaps, the necessary research and analysis becomes not only essential to the FCC's ability to meet its public interest mandates but also eminently doable given cost and time constraints.

VII. Conclusion

We began this review after almost two years of discussion among leading scholars in the fields of communication, law, economics, sociology, political science, and library and information science, as well as specialists in a number of other fields. Six basic frameworks for understanding community information needs emerged from these discussions:

- *Neo-classical economic approaches* to the local communication marketplace that recognizes the need to analyze the ways that the market enables and constrains the choices that individuals make for local media, and analyzes whether those preferences can be realized in give market structures.

- *Traditional policy orientations* towards localism and the marketplace;

- *A "process-position model"* that analyzes how individuals in different positions make judgments about the markets they will serve, with criteria flowing vertically from owners to media executives to managers to producers;

- *A Digital Divide model* that analyzed access to information infrastructure, skills, and opportunities. moving beyond the binary of haves/have-nots to a more complex understanding of the digital skills sets necessary to thrive in an information society;

- *A Network Inclusion/Exclusion model*, building on Metcalfe's law, focusing on the individual and collective costs of exclusion, to both affected minority and low-income groups, but also to broader community life.

- *A Community Communication Ecology model* that focuses on the interrelated layers of community and civic life, the life paths and needs of individuals and neighborhoods, and the layers of media that enabled or constrained individual opportunity, community and neighborhood health, and economic development.

Beginning in late April, 2012, our research team solicited bibliographies from scholars from across the U.S. We assembled approximately 1,000 articles, books, and databases bearing on the eight areas of community information needs that we were investigating. We winnowed these to approximately 494, represented in the accompanying annotated bibliography. The research team then systematically read and reviewed this literature, to first of all, establish what knowledge existed about community information needs, and, second, what model or combination of models would best move the investigation of those needs forward. We stress that there were no limits or *a priori* biases in the review of literature, which drew from communication and journalism, economics, sociology, law, political science, geography, urban studies, urban planning, library and information science, health, transportation, environmental science, education, emergency and risk management.

This review has demonstrated that there are clear and significant information needs of Americans at the individual and community level. A large body of research suggests that many of these needs are not being met, and that access to information and, equally, the tools and skills necessary to navigate it, are essential to even a minimal definition of equal opportunity and civic and democratic participation. Further, in traditional analyses, and more so in contemporary analyses of the "information society," access to information has been demonstrated in multiple fora and disciplines to be the most important correlate of community economic well-being and democracy. The harms caused by exclusion from the networked benefits of participation in an information society are substantial; and can have particularly powerful and long-term consequences for minorities, non-English speakers, those with low-income, and the disabled.

But beyond the problems generated by exclusion, full integration into the information economy offers a unique opportunity to better inform and educate the nation of pluralities that we are rapidly becoming. In this report, we have specifically addressed the significant positive effects (in many cases) of minority and women's ownership on addressing critical information needs. In the present and medium-term future (at least the next decade) minority groups and women will almost certainly continue to constitute unique groups with specific information needs. Minorities based on race, ethnicity, or immigration and language status will remain fractions of the majority, with specific, demonstrable information needs that differ from the majority population. Taken together, all of these groups are becoming the mosaic that is leading inexorably to a more diverse, plural society. But it is important to remember that the simple fact of reaching the threshold of becoming a “majority-minority” nation will not eliminate the information needs of specific communities (and this will continue to hold for women as well). The specific communication that allows groups to meet and express their everyday needs, both to those like ourselves and to those who are different is an essential component in binding a diverse nation together. In a federal democracy, the challenge of communication participation begins in local communities, and must stay rooted in local communities. Despite the vast amount of information, entertainment, and basic human connection that the Internet provides, it cannot by itself substitute for meeting the local information needs of American communities.

We are fortunate today that most of us can log-on, either at home or the local library, and go to a CDC website and get health information that was locked in medical journals only a few short years ago. But, if we have a problem, if we are sick or need well-baby care, in the end, we are faced with finding a doctor in our own communities. Parents deciding whether to send their children to a neighborhood school or a charter school across the city need information on their own local schools. Monster.com may have a wealth of jobs for engineers and managers, but lower-skilled workers, looking for steady employment, needs information about jobs in their own city.

Finally, it is important to recognize that concerns about community information needs are not an either/or proposition. The information needs of local communities are not at odds with the national or global community. But they are unique and specific. That is why we recommend that the FCC conduct serious, rigorous, research into whether and how these needs are being met. We have recommended that modeling community communication ecologies such that we can investigate whether and how local information needs are met is a critical first step to understanding how markets, government policies and individual and group actions can work together to meet the information needs of their communities.

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