



## **Determinants of Bypass Behavior for Critical Access Hospitals (CAHs) in Rural Kentucky**

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## **Abstract**

**Context:** Critical Access Hospitals (CAHs) in rural Kentucky face financial pressures which has caused difficulty introducing new technology and services and retaining qualified health care professionals. Lack of access to quality and affordable health care leads to bypass behavior among rural residents with serious consequences for rural hospitals.

**Purpose:** The objective of this paper is to analyze the reasons attributed to CAH bypass behavior among rural Kentucky patients. This study contributes to the literature regarding hospital bypass behavior by updating our understanding of hospital bypass in rural Kentucky, 45 years after the last local study on the topic.

**Methodology:** Based on the literature, the factors chosen to explain hospital bypass are: location, availability of hospital services, local quality of medical care (perception), and consumer traits. The results obtained from a logit model are presented and discussed in this study. Data was collected by a survey sent to 3,000 rural households in Kentucky in each county served and to surrounding counties often served by CAHs.

**Findings:** Rural Kentucky patients are in fact bypassing the local CAHs influenced by factors related to hospital location, availability of hospital services, perception of quality of local medical care, and certain consumer traits.

# **Determinants of Bypass Behavior for Critical Access Hospitals in Rural Kentucky**

## **I. Introduction**

Rural hospitals provide essential health services to nearly 72 million people who live in the rural areas of the United States (American Hospital Association, 2011). These hospitals are usually smaller, offer basic health care services including ambulatory surgery, emergency services, blood banks and swing beds. They are commonly owned by local governments or nonprofit organizations and focus on delivering primary health care services. The importance of rural healthcare extends beyond access to quality healthcare. Rural hospitals have a significant impact on a rural community's economy. In general, hospitals provide jobs, stimulate local purchasing, help attract industry and retirees and bring outside dollars into the communities via third-party payers, thus injecting money into the local economy that would not exist if the hospital was not present (Ona and Davis, 2011). However, rural hospitals have struggled with financial sustainability for the past two decades. Nationwide 56 rural hospitals have closed since 2010, according to the North Carolina Rural Health Research Program at the University of North Carolina at Chapel Hill (2015) and the number of closures has increased each year during that period. Financial and market characteristics appear to be associated with closure of rural hospitals from 2010 to 2014 (Kaufman et al., 2015). Because many patients are mobile, rural hospitals must compete with larger, urban hospitals that serve a large geographic area. As a result, many patients regularly travel long distances for what is perceived as better quality and desired service (Bronstein and Morrisey, 1991).

Studies of bypass behavior are not new in health care research. In the following studies bypass was defined as a patient who received medical services from a hospital located further away than

the hospital located closest to their residence. However, the distance between the residence of the patients and the hospital was calculated in different ways (Liu et al., 2007). Adams and Wright (1991) conducted a study of rural Medicare beneficiaries in rural Minnesota, North Dakota, and South Dakota and found that 40 percent of the samples bypassed their closest hospital. Williamson et al. (1994) estimated a bypass rate of 44 percent for surgical services among rural residents in Washington. Radcliff et al. (2003), in an attempt to overcome limitations of previous studies where single geographic area, types of payer, or type of diagnosis were examined, studied the inpatient discharge data from several different states around the US . Through descriptive analysis, they found the overall bypass rate to be 30 percent, with little change between 1991 and 1996. Two similar studies both conducted by Liu et al. (2007) and Liu et al. (2008) found that approximately 60 percent of survey patients bypassed their local Critical Access Hospitals (CAHs) for inpatient care.

Over four decades ago, Kane (1969) found that Kentucky rural residents were bypassing the local hospital based on a survey to rural residents. He determined health care priorities and expectations among rural consumers and found that the priorities set by the people favored emergency care above all other services and that proximal access to medical care is an important factor affecting rural hospital bypass behavior. Anecdotal evidence from extension work in Kentucky's rural communities has revealed that hospital bypass is still common in rural Kentucky.

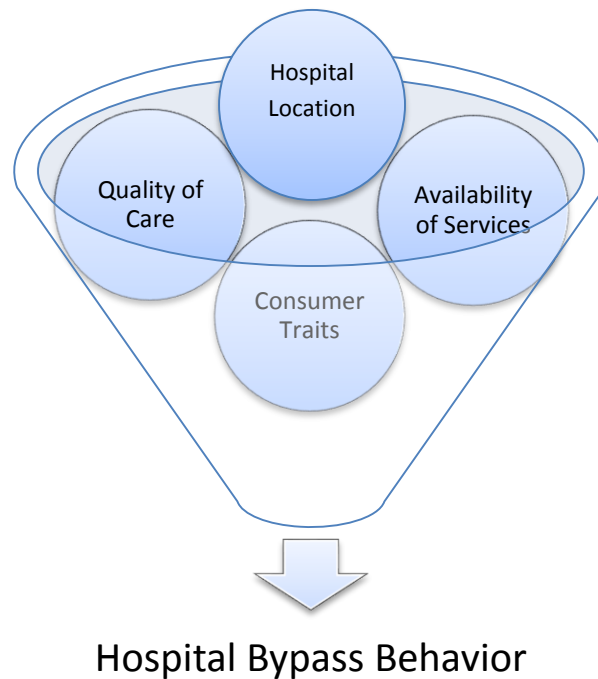
Kentucky is a diverse state with many pockets of rural communities. There are 89 rural counties in Kentucky (120 counties in total). Rural hospitals provide health care to 45 percent of Kentuckians and serve a disproportionate share of low-income and elderly citizens (Auditor of Public Accounts, 2015). Additionally, rural residents may have a greater need for health care

services because they tend to be less healthy, older, lower-income and more likely to have a chronic illness than urban dwellers (Glasgow et al., 2004; Eberhardt et al., 2001; Ricketts, 1999). It is crucial to understand the reasons for bypass behavior among rural Kentucky patients particularly in the wake of changing health care policy that will likely transform the landscape of rural health care quality and quantity. This study contributes to the literature regarding hospital bypass behavior by updating our understanding of hospital bypass in rural Kentucky, 45 years after the last local study on the topic. The hope is that this approach will provide a fresh perspective on hospital bypass and provide additional insights in the state. It is expected that academic research of this sort will have an important impact on healthcare policy in rural areas in the United States around the debate on CAH closures<sup>i</sup>.

The authors want to emphasize the fact that even though several years have passed since the information used for this study was collected and that there have been many changes in the rural health policy landscape that have affected the different CAHs in different ways, the issue of CAHs bypass is still present and important. Even in states like Kentucky which expanded Medicaid, hospital closures have not been prevented in the last years. Currently, there are no clear results on the implications on how rural CAHs have adjusted to the Affordable Care Act (ACA) which seeks to provide more Americans health insurance coverage but at the same imposes tougher regulations for these organizations.

## II. Conceptual Framework

Overall, an extensive literature review on hospital bypass behavior seems to identify four main factors that affect rural hospital bypass behavior: hospital location, availability of hospital services, quality of hospital care, and consumer traits. Figure 1 describes the conceptual model and it is described in greater detail below.



**Figure 1. Factors Affecting Hospital Bypass Behavior**

The first of these factors may seem obvious; if all hospitals were equal, one would expect that people would most often visit the closest hospital to reduce the cost and time associated with traveling further. In fact, almost all related studies found a decrease in the prevalence of bypass with the increase in distance to alternative hospitals (Adams et al., 1991; Radcliff et al., 2003; Goldsteen et al., 1994; Piette and Moss, 1996; Goodman et al., 1997; Tai et al., 2004; Basu, 2005; Pierce, 2007; Jintanakul and Otto, 2009).

The second factor found in the literature reveals that availability of hospital services is an important aspect for bypassing a hospital and when consumers decide which hospital to choose. For example, lack of specialty care, including complex surgical treatment or specialists and severe illness, often are cited as reasons for hospital bypass in several studies (Liu et al., 2007; Adams et al., 1991; Williamson et al., 1994; Radcliff et al., 2003; Tai et al., 2004; Jintanakul and Otto, 2009; Inguanzo and Harju, 1985; Buczko, 1992; Taylor and Capella, 1996). Another important hospital attribute affecting hospital's choice is the availability of technology (Adams et al., 1991). Payment type in regards to the type of insurance is a factor that has also been found to be important when deciding which hospital to visit. A recent study found (Allen IV et al., 2007) that acceptance of Medicaid/Medicare with use of a sliding fee scale versus acceptance of only private insurance was the attribute most valued by rural residents in Kentucky when investigating residents' willingness-to-pay for attributes of rural health facilities, though hours opened, access to health care providers, and presence of an emergency room were also significant factors.

The third factor in the literature finds that consumer's perception of local medical care quality has an impact on bypass behavior. Rural patients usually perceive rural hospitals as low quality (Roh and Moon, 2005). A mail survey of rural residents in southern Illinois (Smith, 1994) discovered some critical findings: consumers do perceive their hospital to be lower in quality across a wide range of quality-related attributes compared with a more distant alternative; these perceptions of quality are shared by consumers who have and have not recently used a hospital. This finding validates the importance of communications, particularly in rural areas and points out that both a person's own perception and the perception of his or her family are important in the decision to choose a hospital. Hospital quality is also discussed in terms of its reputation;



reputation and satisfaction with the local hospital were found as factors associated with bypassing local CAHs (Liu et al., 2007).

The fourth factor in the literature finds that consumer traits have an impact on hospital choice behavior. Gender plays a role; women are more likely to use the local hospital than men (Buczko, 1992), and women tend to use nonteaching hospitals (Cohen and Lee, 1985). Additionally, aged patients strongly prefer closer hospitals and those of greater scale and service capacity (Tai et al., 2004). Age and income were also found as factors influencing CAHs' bypass behavior in Liu' study (Liu et al., 2007); patients with income between \$20,000 and \$40,000 were less likely to bypass compared to those with lower income. However, McDaniel et al. (1992) found that in rural communities the likelihood of going to the local hospital decreases with income. Further, patients with more children in the household were more likely to choose the "other rural hospital" over the "closest rural hospital" alternative (Tai et al., 2004). Radcliff et al. (2003) found that patients covered by either commercial or managed care insurance have higher bypass rather than other payer types. Dranove et al. (1993) found that Medicaid patients are more likely to visit hospitals with lower costs and fewer service offerings and privately insured patients go to hospitals offering more services. Roh and Moon (2005) found that public program beneficiaries are less likely to bypass local rural hospitals than those in managed care programs.

Based on factors influencing hospital bypass behavior in the literature, the factors chosen to explain hospital bypass in this paper's conceptual model are: hospital location, availability of hospital services, local quality of medical care (perception), and consumer traits. Among the factors included in hospital location are traveling time, traveling cost, and preference of service at the location of the hospital. Some of the factors included in availability of hospital services are

available technology, severity of illness and payment type (the complete list of factors along with their descriptive statistics is included in Table 1). Local quality of medical care refers to the perception of the respondents regarding local quality of hospital, quality of ambulance service, quality of medical care, and available specialists among others (the complete list of factors along with their descriptive statistics is included in Table 2). Finally, consumer traits includes standard socioeconomic variables like age, income, employment status, children, marital status, residency of relatives, and family preferences (the complete list of factors along with their descriptive statistics is included in Table 3).

**Table 1. Hospital Location and Availability of Hospital Services: Descriptive Statistics**

<i>Variables</i>	<i>Descriptions</i>	<i>Mean</i>	<i>S.D.</i>
<u>Hospital Location</u>			
Traveling time	3 = Very important	2.195	.747
Traveling cost (gasoline, hotels, etc)	2 = Somewhat important	2.142	.764
Relative live at hospital location	1 = Not important	1.598	.776
I prefer the service at this location		2.513	.642
Available shopping opportunities		1.276	.582
<u>Availability of Hospital Services</u>			
Better quality of medical care		2.670	.625
Referred by doctor/ nurse		2.644	.540
Available technology		2.625	.642
Better reputation		2.571	.662
Severity of illness		2.563	.686
Local service of this type was not available		2.406	.780
Specific service and size		2.356	.662
My family prefer the service at this location		2.314	.713
Specialist only available at this location		2.276	.770
Payment type		1.966	.810
Insurance require to go to this location		1.893	.857

N = 261

Source: Health Care Service Survey, University of Kentucky, 2008

**Table 2. Perception of Quality of Local Medical Care: Descriptive Statistics**

<i>Variables</i>	<i>Descriptions</i>	<i>Mean</i>	<i>S.D.</i>
Accepts my insurance status	4 = Excellent	3.241	.803
Quality of primary care physicians	3 = Good	3.042	.887
Quality of ambulance service	2 = Fair	3.004	.792
Quality of hospital nurses	1 = Poor	2.966	.865
Quality of medical care		2.889	.915
Quality of hospital		2.820	.890
Availability of the service		2.667	.957
Availability technology		2.655	.934
Reputation		2.628	.986
Available specialists		2.375	.018

N = 261

Source: Health Care Service Survey, University of Kentucky, 2008

**Table 3. Socioeconomic and Demographic Characteristics: Descriptive Statistics - Mean**

<i>Variables</i>	<i>Descriptions</i>	<i>Sample</i>	<i>Kentucky</i>
<b>Socioeconomic and Demographic Characteristics</b>			
Gender	1 = Female, 0 = Male	.51	.51
Age		55.39	37.90
Elder	1 = Older than 65, 0 = Otherwise	.27	.13
Less	1 = Annual income lower than \$25,000, 0 = Otherwise	.29	.33
Employment	1 = Currently work, 0 = Otherwise	.53	.60
Number of kids in household		.32	.29
Marital status	1 = Married or member of an unmarried couple, 0 = otherwise	.72	.67
Pure Private	1 = Pure private, 0 = Otherwise	.59	.65
Pure Government	1 = Pure government, 0 = otherwise	.21	.32
Uninsured	1 = Uninsured, 0 = otherwise	.05	.14
N		261	4,339,367

Sources:

Sample : Health Care Service Survey, University of Kentucky, 2008;

Kentucky: Gender, age, elder, employment, number of kids in household, marital status, insurance: US Bureau of

Census; Income: [www.npr.org](http://www.npr.org); Population size: Kentucky State Data Center.

### **III. Methodology**

In this study bypass is defined as patients receiving inpatient care services from a hospital located farther away than their local Critical Access Hospital (CAH)<sup>ii</sup> or utilizing a non-local CAH. The local CAH is the CAH in the residing or nearest (smallest distance<sup>iii</sup>) neighboring county.

#### **Data Collection**

Data for this study were obtained from a specifically designed survey: the University of Kentucky Health Care Service Survey, which was mailed to 3,000 rural Kentucky households in 2008. The survey was sent to a total of 60 counties that either had a CAH or an adjacent county served by a CAH. Within those counties, the surveys were randomly distributed and sent to an equal number of households.

Respondents were asked if they or any members in their household visited the hospital in the last 24 months as well as which hospital they normally visit for inpatient care. This pre-screen question narrowed the scope to the target population or those who recently used hospital services (either in a CAH or non CAH) for inpatient care. Since not all respondents visited a hospital in the past two years, hospital bypass behavior was determined for 261 surveys; thus, only these responses were used in the analysis.

Respondents were asked a series of critical questions: First about the factors important when deciding which hospitals to visit including traveling time (used for hospital location). Specifically, the survey asked: “How important was each of the following when choosing which

**hospital** to visit?” The responses were coded as follows: 3 = very important, 2 = somewhat important, and 1 = not important. Second, the respondents were asked about their perception of the quality of the local medical services in the county where they lived or in the neighboring county. Specifically, “How would you rate the following aspects of local medical care in **THE COUNTY (or if no services in your county, the neighboring county) WHERE YOU LIVE?**” Responses were coded as follows: 4 = excellent, 3 = good, 2 = fair, 1 = poor. Finally, the respondents answered a series of questions to indicate individual/household characteristics.

Due to the fact that the response rate obtained was low it was important to make a comparison between the mean of the socio economic characteristics of the sample and the average population of Kentucky to appreciate what the findings might reflect. This comparison is presented in Table 3 showing that the sample closely reflected Kentucky’s population. The main difference was that the sample population was older and more likely to be insured.

Some data on demographic variables of Kentucky were obtained from the US Bureau of Census and the Kentucky State Data Center.

## Model

The dependent variable is a binary variable representing hospital bypass behavior, with 1 indicating respondents who bypassed the local CAH in the last two years and 0 indicating respondents who did not bypass. The independent variables comprised those data from the survey that represented the respondent's value of hospital attributes, perception of their local medical care, and their personal characteristics.

The dichotomous nature of the dependent variable in this model suggests that either a probit or a logit model is appropriate. Both the probit and the logit forms were tried yielding similar results, however only one set of coefficients (logit) is presented and discussed here. The specification of the logit model is discussed in detail in several econometric texts such as the one of Pindyck and Rubinfeld (1981). According to these authors, an important appeal of the logit model is that "...it transforms the problem of predicting probabilities within a (0,1) interval to the problem of predicting the odds of an event's occurring within the range of the entire real line."

The model used to analyze the factors affecting hospital bypass behavior is given by:

$$Y_i = \beta_0 + \beta_1 L_i + \beta_2 S_i + \beta_3 Q_i + \beta_4 D_i + \varepsilon_i$$

For each equation,  $Y_i$  represents the dependent variable decision to bypass the local CAH and it equals 1 if patients bypass the local CAH and 0 if patients did not bypass the local CAH;  $i$  represents the patient;  $\beta$  represents the coefficients to be estimated;  $L$  represents the hospital location;  $S$  represents the availability of hospital services;  $Q$  represents perception of quality of local medical care;  $D$  represents the respondent's demographic characteristics;  $\varepsilon$  is the error term of the logistic distribution.



#### **IV. Results & Discussion**

According to the information from the survey, the bypass rate of the local CAHs is 84.7 percent, which is relatively high compared to other studies where the average bypass rates ranged from 30 percent to 70 percent, as mentioned in the literature review.

The results of the Logit model are displayed in Table 4, which shows the estimated coefficients of the factors that significantly CAH bypass behavior in rural Kentucky obtained as well as the odd ratios for them. Note that, due to limited space, insignificant factors were omitted from the Table.

Hospital Location: The results indicate that respondents are less likely to bypass a local CAH if “traveling time” was very important when deciding which hospital to visit.

Availability of Hospital Services: The results indicate that respondents are more likely to bypass a local CAH if “payment type” and “I prefer the service available at this location”—referring to the location where they were hospitalized—were considered important factors when choosing which hospital to visit.

Perception of Quality of Local Medical Care: The results indicate that respondents are less likely to bypass a local CAH if the perception of “quality of local hospital” was considered excellent, the “quality of local ambulance service” was rated fair, good or excellent and the “quality of local medical care” was perceived as good or excellent. They are more likely to bypass the local CAH when the perception about “available specialists” in the county where they lived or neighboring county was considered good or excellent.

Consumer Traits: The results indicate that the respondents who are employed and respondents with a lower income are less likely to bypass the local CAH.

In order to have an appreciation of the size of the factors' influences on bypass behavior, the odds ratios were calculated. Interpretation of significant estimates is as follows: for someone who considers 'payment type' very important when choosing which hospital to visit, the odds of bypassing are 16.8 times larger than the odds for someone who does not; for someone who considers 'I prefer the service available at a particular location' very important when choosing which hospital to visit, the odds of bypassing are 89.3 times larger than the odds for someone who does not; for someone who considers 'available specialists' in the local county good, the odds of bypassing are 17.2 times larger than the odds for someone who does not consider them good and for someone who considers 'available specialists' in the local county excellent, the odds of bypassing are 62.4 times larger than the odds for someone who does not consider them good.

For the factors with negative coefficients, the odd ratios are smaller than one, which means that the event is less likely to occur. In general, odd ratios less than one are harder to interpret than the odd ratios greater than one (Davies et al., 1998). The odds ratios tell us that for every increase in 'traveling time' for those respondents who consider this factor very important in choosing which hospital to visit, the odds of bypassing decrease by a factor of 0.04; for every increase in the perception of local 'quality of hospital' for those respondents who perceive this factor as excellent the odds of bypassing decrease by a factor of 0.01; for every increase in the perception of local 'quality of ambulance' for those respondents who perceive this factor as fair the odds of bypassing decrease by a factor of 0.01.

**Table 4: Logit Results of Bypass Behavior in Rural Kentucky (N=261)**

<b><u>Hospital Location</u></b>	Coefficient	Standard Error	Odds ratio
<i>Traveling time</i>			
Some important	-1.49	1.48	0.23
Very important	-3.33*	1.70	0.04
<i>I prefer the service available at a particular location</i>			
Some important	2.39	2.01	10.89
Very important	4.49**	2.16	89.33
<b><u>Value of Attributes in the Hospital Choice</u></b>			
<i>Payment type</i>			
Some important	1.72	1.05	5.61
Very important	2.82**	1.20	16.82
<b><u>Perceptions of Aspects of Local Medical Care</u></b>			
<i>Quality of hospital</i>			
Fair	-.72	1.71	0.48
Good	-1.11	1.87	0.33
Excellent	-4.19*	2.25	0.01
<i>Quality of ambulance service</i>			
Fair	-4.85*	2.71	0.01
Good	-5.38**	2.68	0.00
Excellent	-6.31**	3.01	0.00
<i>Quality of medical care</i>			
Fair	-2.35	2.36	0.09
Good	-5.47**	2.77	0.00
Excellent	-6.17**	3.11	0.00
<i>Available specialists</i>			
Fair			
Good	1.34	1.09	3.80
Excellent	2.85**	1.33	17.22
	4.13**	1.93	62.37
<b><u>Demographics</u></b>			
<i>Low income</i>	-2.51**	1.04	0.08
<i>Employment</i>	-2.35**	1.08	0.09
Pseudo R square	0.4433		
* $P < .1$   ** $P < .05$   *** $P < .01$			

## V. Conclusion

CAHs in rural Kentucky face financial pressures due to low occupancy rates and declining government payments. Lower occupancy rates have increased operation costs and hindered efforts to introduce new technology and services, and have caused difficulty in retaining qualified health care professionals. Lack of access to quality and affordable health care leads to bypass behavior among rural residents with serious consequences for rural hospitals. This paper analyzed the reasons attributed to CAH bypass behavior among rural Kentucky patients. This is an important issue even more considering the trend of hospitals closing.

The results were consistent with previous studies finding that rural Kentucky patients bypass their local CAHs due to availability of hospital services, quality of hospital care, and consumer characteristics. A few of the main findings, policy implications are as follows:

1. The more important traveling time is to the consumer when choosing a hospital, the lower the probability of bypass. This finding corresponds to the literature and expectations and affirms that a CAH's greatest functional asset—its location—is indeed valued by patients. Critical Access Hospitals and other small, rural hospitals provide vital services in rural areas (HealthIT.gov, 2014).
2. This study finds that payment type, one of the attributes included in availability of hospital services, is significantly positively related to bypass behavior. This attribute has mainly to do with patients insurance policies and whether the CAH can accommodate flexibility in patients' ability to pay out of pocket expenditures. The more important this factor is for the consumer when deciding which hospital to choose, the higher is the

possibility of bypassing a CAH. If closure is to be avoided is important for CAHs to provide flexibility of payment through the acceptance of different types of insurance, a finding that coincides with the literature about residents' willingness to pay for attributes of rural health care facilities (Allen et al., 2014). Additionally, it has been found that in rural settings, the exclusion of certain providers could force residents to travel long distances to find care and could be an unreasonably delay in accessing services (Rural Assistance Center, 2014).

3. The more respondents prefer a service at a particular location, the more likely they are to bypass the local CAH. This happens especially when CAH often do not offer specialized services, which is the cause of some bypass to larger facilities. The collaboration of CAHs with other health providers has shown to have dramatic positive effects on a rural community's access to more and higher quality health care services (United States Department of Health and Human Services, 2010.).
4. The greater the perception is of local healthcare quality (i.e., quality of the hospital, quality of ambulance service and quality of medical care), the lower the possibility of bypassing the CAH. These results agree with the literature and the expectations and suggest that quality of care and emergency services are strongly valued by patients. Once again collaboration could play an important role in this aspect. One interesting finding was that the better the perception about available specialist in the local county the higher are the possibilities of bypass the local CAH. Respondents may be more inclined to use the available specialists as a substitute of the CAH in certain cases.
5. Consumer characteristics—particularly income and employment—are strong determinants of bypass behavior. The lower the patient's income, the lower the bypass

rates, and if the patient is employed, the lower the bypass rate. There was not a clear expectation about the signs of the variable income since the literature indicates contradictory results. About the variable employment, the requirements of the insurance companies to receive local medical care for people employed in those areas may explain its behavior.

One limitation of the study is possible selection bias. One sign of this is the high rate of hospital bypass estimated by the survey of 84.7%. This may be the result of a skewed sample of respondents that were older and recently hospitalized. If this sample needed specialty care, then this may have led to behavior which we defined as bypass. On the other hand, focus groups have revealed that many rural Kentuckians view their local CAH as a “Band-Aid station” (Community and Economic Development Initiative of Kentucky, 2013), which reflects the poor perception that the hospital is only capable of putting on a Band-Aid. Such negative perceptions, if widespread in rural Kentucky, may result in higher bypass rates than in other parts of the country. Selection bias may also be due to the low response rate to the survey, though it seemed in Table 3 that the sample closely reflected Kentucky’s population. With additional funding, future research should employ multiple survey techniques (e.g. phone, online, mail) to obtain better results.

Overall, our study suggests that hospitals could also collect better patient satisfaction measures through surveys or focus groups, as is required every three years through the Community Health Needs Assessment (CHNA) process. This would allow rural CAHs to start building quality measurement capacity and publish and share these results with the community as a useful way to raise the residents’ awareness about the local CAH.

Our of recommendations for future research are: First, to expand this study's scope by looking beyond Kentucky and at non-CAH rural hospitals, while still trying to provide rural hospital administrators with information on which specific hospital attributes are valuable to local users. Second: to utilize other techniques to complement quantitative analysis, such as key interviews and the use of focus groups can also be very useful and informative when performing studies on the behavior of rural hospitals in general. Third, to consider commuting patterns and road type on reasons for hospital bypass given high commuting rates between rural and urban areas. This will consider the fact that the straight line distance used between the location of a hospital and a patient's home might not be the best way to calculate traveling time and traveling costs. Under many situations traveling time and costs depend on road conditions. Finally, while providing health care in rural areas poses many challenges, it is essential that researchers and practitioners work together to develop strategies that provide rural residents with access to high-quality health care and services.

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<sup>i</sup> During the last six years three rural hospitals closed in the state, two of those were CAHs. Currently, there are 15 more hospitals in Kentucky at risk of closing based on their financial performances, almost all of them rural and 8 of them CAHs. This information is from the article 15 Kentucky hospitals at risk of closing by Ayla Ellison. Published March 15, 2015. Available at: <http://www.beckerhospitalreview.com/finance/15-kentucky-hospital-at-risk-of-closing.html>.

<sup>ii</sup> The Federal Balanced Budget Act of 1997 created the Critical Access Hospital (CAH) to improve access to healthcare services in rural areas. A CAH is a rural hospital that is certified to receive cost-based reimbursement from Medicare. The reimbursement that CAHs receive is intended to improve their financial performance and thereby reduce hospital closures. Under this program, CAHs are eligible for cost plus 1 percent reimbursement, flexible staffing and services, network with an acute care hospital for support, and also access to Flex Program grant money. As of November 2014, there were 1325 certified CAHs located throughout the United States, 28 of them located in Kentucky according to the Flex Monitoring Team Site.

According to the U.S. Department of Health and Human Services. Health Information Technology, A Critical Access Hospital (CAH) is a hospital certified under a set of Medicare Conditions of Participation (CoP), which are structured differently than the acute care hospital CoP. Some of the requirements for CAH certification include having no more than 25 inpatient beds; maintaining an annual average length of stay of no more than 96 hours for acute inpatient care; offering 24-hour, 7-day-a-week emergency care; and being located in a rural area, at least 35 miles drive away from any other hospital or CAH (fewer in some circumstances). Available at: <http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Introduction/critical.html>).

<sup>iii</sup> The smallest distance in this study is based on a straight line distance.