Determinants of Willingness to Accept Kidney Transplantation Among Chronic Kidney Disease Patients in Ghana

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Abstract

Background

The burden of chronic kidney disease in Africa is three to four times higher than high-income countries and the cost of treatment is beyond the reach of most affected persons. The ultimate treatment for end stage renal disease is kidney transplantation which is not available in most African countries. As kidney transplantation is a budding treatment in Ghana, this study assessed factors which could influence Chronic kidney disease patients’ willingness to accept it as a treatment option.

Aim

The aim of this study was to assess the determinants of willingness to accept kidney transplantation as a treatment option for end stage renal disease among chronic kidney disease patients in Ghana.

Methods

This cross-sectional survey was carried out among chronic kidney disease patients in Korle-Bu Teaching Hospital. Consecutive sampling method was used to recruit consenting patients. Structured questionnaire and standardized research instruments were used to obtain information on demographic, socio-economic characteristics, knowledge about transplant, perception of transplantation, religiosity and spirituality. Logistic regression model was used to assess the determinants of willingness to accept kidney transplantation.

Results

342 CKD patients participated in the study of which 56.7% (n = 194) were males. The mean age of the participants was 50.24 ± 17.08 years. The proportion of participants willing to accept kidney transplantation was 67.3% (95%CI: 62.0–72.2%). The factors which influenced participants’ willingness to accept this treatment include; willingness to attend a class on kidney transplantation (p < 0.016), willingness to donate a kidney if they had the chance (p < 0.005), perception that living person could donate a kidney (p < 0.001) and perception of improved quality of life after transplant (p < 0.005). The barriers for accepting kidney transplantation were anticipated complications of transplant surgery and financial constraints.

Conclusion

More than two-thirds of CKD patients were willing to accept kidney transplantation and this is influenced by multiple factors. Government health agencies must consider full or partial coverage of kidney
transplantation through the existing national health insurance scheme. Further, efficient educational programmes are required to improve patients and physician's knowledge on the importance of kidney transplantation.

**Background**

Chronic kidney disease (CKD) is a major public health problem especially in low and middle-income countries (LMICs), where its prevalence is higher than the global prevalence. Worldwide, prevalence of CKD is between 11 to 13% compared to 13.9% in sub-Sahara Africa (1, 2), with prevalence between 17% in Ghana and 30% in Zimbabwe (1). Importantly, in sub-Saharan Africa (SSA), including Ghana, CKD mostly affects people between 20 to 50 years of age representing the economically productive group of society, most of whom succumb to the disease because the cost of renal replacement therapy is beyond their reach (3).

The treatment options for chronic kidney diseases include haemodialysis, peritoneal dialysis and kidney transplantation, with hemodialysis being the most common treatment in sub-Saharan Africa (4). In LMICs, treatment rates are low due to the high cost of treatment, inadequate skilled personnel and limited resources (4). Thus, majority of the patients cannot afford the full treatment and hence remain mostly symptomatic (5).

Kidney transplantation is carried out in few African countries: South Africa, Nigeria, Mauritius and recently, in Ghana (6). Although kidney transplantation is the ultimate treatment of end stage renal disease, transplant rates are low in Africa (6). The challenges faced by patients tend to influence their perceptions of the disease and the available treatment options. Observations at a large tertiary facility in Ghana revealed that patients diagnosed with chronic kidney disease and referred to the facility for specialist management often present very late, often seeking alternative treatment including unorthodox methods before seeking expert medical treatment (7). The most likely explanation is lack of funds to seek health care and unavailability of health care facilities in a financially constrained setting like Ghana. In addition, patients and their caregivers hold varying views and perceptions about chronic kidney disease and its management. At the patient level are factors relating to cost, social, traditional and cultural beliefs, religious beliefs and fear of side-effects from haemodialysis (8, 9). The acceptability of Kidney transplantation as a treatment may be influenced by many factors, including financial constraints, religious/cultural beliefs, and lack of awareness of the need for this treatment amongst others.

In Ghana, majority of patients with End Stage Renal Disease (ESRD) are on haemodialysis. Kidney transplantation was introduced in 2008 as a new treatment option. Given the low transplant rates, there is need to assess knowledge of patients concerning kidney transplant and their perception and willingness to accept this treatment option. Identifying factors that influence the willingness to accept kidney transplant will help health care providers tailor client education to positively impact on patients’ decision-making regarding transplant. Furthermore, these will help policymakers to enact policies that will address the factors negatively influencing willingness to choose transplant as treatment option. The current study,
therefore, seeks to assess CKD patients’ knowledge on kidney transplantation and their willingness to accept kidney transplant as treatment option for ESRD.

**Methods**

**Population and study design**

This study was a facility-based descriptive cross-sectional quantitative study that was conducted from April to May 2019, among CKD patients attending the Korle-Bu Teaching Hospital (KBTH) is a national referral centre for patients with CKD including ESRD patients receiving renal replacement therapy (haemodialysis and kidney transplant).

This study recruited ESRD patients on haemodialysis and Stage III-V CKD patients not on haemodialysis. Participants 18 years and over, were recruited consecutively from the dialysis units of the Medical department, the National Cardiothoracic Centre of the Korle-Bu Teaching Hospital and the central outpatient department. Exclusion criteria were patients who already had kidney transplant, or those with acute kidney injury and vulnerable patients such as pregnant women and those institutionalized. Participation in this study was completely anonymous and voluntary; written consent was obtained from the recruited participants. Dialysis patients were recruited while they were waiting for their dialysis sessions and not during the dialysis treatment.

**Data collection**

Interviewer structured questionnaire comprising 50 items was administered to the research participants. Questionnaires were developed based on a previous study\(^5\) and modified to suit aims of the current study. The questionnaire was pilot tested in a different dialysis treatment I dialysis unit with similar socio-demographic characteristics as the study population to establish construct validity. The language and content of the questionnaire were reviewed after pilot testing for easy understanding and administration. The final questionnaire was used to obtain basic socio-demographic data (age, gender, educational status, marital status, ethnicity, religion, employment, income, wealth index and living status). Information on participant’s social support system (from family, friends) and their insurance status was also obtained. In addition, medical information (comorbidities, duration of dialysis therapy, frequency of dialysis) was collected. Further, information was obtained on the knowledge, attitude and perception of kidney transplantation. Socio-economic status was assessed using the wealth quintile which was categorized into quintiles and percentage of participants per quintile (from 1 to 5) was determined.

**Willingness to accept kidney Transplantation**

This was assessed by asking the respondents the question, “Would you undergo kidney transplant if you are given a chance when the time comes?”. The possible options given were “Yes,” “No,” and “Not sure” and were dichotomized into “Yes” and “No/Not Sure”.

**Patient knowledge, attitude and perception**
Knowledge
Respondents rated their level of knowledge on a 5-point scale (1 - No knowledge, 2 – Below average, 3 – Average, 4 – Above average, 5 – Well informed). This was further categorized into below average (1–2 points), average (3 points) and above average (4–5 points) knowledge. These additional questions were also asked: “Heard about kidney transplant”, “Physician discussed transplant with patient”, Ever referred for transplant evaluation”, “Aware of transplant centers in Ghana” and others.

Attitude
Patients attitude was assessed with these questions “Do you feel the need to know more about kidney transplant”, “Would you attend a class about kidney transplant” and “If you had had the opportunity, would you have donated your kidneys?”. 

Perception
Perceptions about kidney transplantation was assessed using the question, “Do you think a living person can donate a kidney to patients needing it?” Furthermore, the perception of participants was assessed by asking if kidney transplantation would affect their quality of life compared to dialysis. Possible options were, “it will not affect the quality of life”, “improve the quality of life”, “decrease the quality of life”, “I don't know”. These were categorized into correctly answered (improve quality of life) and incorrect/Don’t know. Also perceived barriers to undergoing a kidney transplant among participants who were unwilling to accept a kidney transplant if given a chance when the time comes were assessed by asking respondents to rank the level of importance, they attached to each of the barriers (Table 2).
Table 2
Participant’s perception towards barriers to kidney transplant among participants unwilling to accept kidney transplantation n = 65

| Perception                                      | Frequency | Percentage |
|-------------------------------------------------|-----------|------------|
| I don't trust the doctors                       |           |            |
| Not important                                   | 55        | 87.3       |
| Somewhat important                              | 1         | 1.59       |
| Important                                       | 1         | 1.59       |
| Don't know                                      | 6         | 9.52       |
| Need more time to think and learn about it      |           |            |
| Not important                                   | 48        | 76.19      |
| Somewhat important                              | 8         | 12.7       |
| Important                                       | 2         | 3.17       |
| Very important                                  | 1         | 1.59       |
| Don't know                                      | 4         | 6.35       |
| Religious concerns                              |           |            |
| Not important                                   | 41        | 65.08      |
| Somewhat important                              | 2         | 3.17       |
| Important                                       | 1         | 1.59       |
| Very important                                  | 6         | 9.52       |
| Don't know                                      | 13        | 20.63      |
| Complications from transplant                   |           |            |
| Not important                                   | 24        | 38.1       |
| Somewhat important                              | 4         | 6.35       |
| Very important                                  | 25        | 39.68      |
| Don't know                                      | 10        | 15.87      |
| Surgical concerns-pain, fear                    |           |            |
| Not important                                   | 30        | 47.62      |
| Somewhat important                              | 3         | 4.76       |
| Very important                                  | 25        | 39.68      |
### Frequency and Percentage

| Don't know | 5 | 7.94 |
| **Don't want somebody else's organ in my body** | | |
| Not important | 45 | 71.43 |
| Very important | 9 | 14.29 |
| Don't know | 9 | 14.29 |
| **Don't think I'll ever need it. I feel healthy** | | |
| Not important | 54 | 85.71 |
| Somewhat important | 1 | 1.59 |
| Important | 1 | 1.59 |
| Very important | 5 | 7.94 |
| Don't know | 2 | 3.17 |
| **Financial concerns** | | |
| Not important | 31 | 49.21 |
| Very important | 19 | 30.16 |
| Don't know | 13 | 20.63 |

### Data analysis

Descriptive statistics on categorical variables were reported in the form of frequencies and percentages while that of the continuous variables were presented in terms of means and standard deviation. Chi-squared/Fisher’s exact test of independence was used to test for association between categorical independent variables and the outcome variable. Welch t-test was used to compare average age of those willing to accept and those not willing to accept kidney transplantation. Test of normality of continuous variables was done using the skewness and Kurtosis test. Multiple Logistic regression model as well as Poisson regression model were used to assess the effect of the various independent variables on the willingness to accept transplantation. All statistical tests were done at 5% significance level. The results obtained from the various analyses are presented in Tables.

### Results

**Participant characteristics by willingness to accept kidney transplantation**
In all 342 patients participated in the study of which 56.7% (n = 194) were males. The average age of the participants was 50.24 ± 17.08 years. The proportion of patients who would like to undergo kidney transplant was 67.3% (95% CI: 62.0–72.2%) while 18.4% were not willing to accept, and 14.3% were indecisive (Don't Know/Not sure) about accepting kidney transplantation. About 40% of the participants had completed tertiary education and 43.0% were employed. In all, 29.0% were on dialysis and the proportion of dialysis patients who were willing to undergo kidney transplant was about 12.0% higher than those who were not on dialysis (75.8% vs 63.8%, p = 0.028). The proportion of patients with some form of medical insurance who would like to undergo kidney transplant was 17% more than those without (69.3% vs 52.4%, p = 0.028) – Table 1.
Table 1
Participant characteristics by willingness to accept kidney transplantation

| Willing to undergo kidney transplant | No(%) | Yes(%) | Total(%) | p-value |
|-------------------------------------|-------|--------|----------|---------|
| **Sex**                             |       |        |          | 0.129   |
| Male                                | 57 (29.38) | 137 (70.62) | 194 (56.73) |         |
| Female                              | 55 (37.16) | 93 (62.84) | 148 (43.27) |         |
| **Current Age (years)**             |       |        |          | 0.233   |
| Mean ± SD                           | 51.86 ± 18.07 | 49.45 ± 16.56 | 50.24 ± 17.08 |         |
| < 40 years                          | 27 (30.34) | 62 (69.66) | 89 (26.02) | 0.470   |
| 40–59 years                         | 44 (30.77) | 99 (69.23) | 143 (41.81) |         |
| >=60 years                          | 41 (37.27) | 69 (62.73) | 110 (32.16) |         |
| **Current Marital Status**          |       |        |          | 0.187   |
| Married                             | 60 (30.93) | 134 (69.07) | 194 (56.73) |         |
| Single                              | 27 (33.33) | 54 (66.67) | 81 (23.68) |         |
| Widowed                             | 20 (45.45) | 24 (54.55) | 44 (12.87) |         |
| Divorced                            | 5 (21.74) | 18 (78.26) | 23 (6.73) |         |
| **Religion**                        |       |        |          | 0.427   |
| Christian                           | 99 (31.73) | 213 (68.27) | 312 (91.23) |         |
| Muslim                              | 11 (44) | 14 (56) | 25 (7.31) |         |
| Non-denominational                  | 2 (40) | 3 (60) | 5 (1.46) |         |
| **Educational Level**               |       |        |          | 0.052   |
| No formal education                 | 10 (52.63) | 9 (47.37) | 19 (5.56) |         |
| Primary/JHS                         | 42 (38.53) | 67 (61.47) | 109 (31.87) |         |
| Senior high School/Vo              | 19 (25) | 57 (75) | 76 (22.22) |         |
| Tertiary education                  | 41 (29.71) | 97 (70.29) | 138 (40.35) |         |
| **Employment Status**              |       |        |          | 0.359   |
| Unemployed                          | 41 (35.65) | 74 (64.35) | 115 (33.63) |         |

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; %§ represent row percentages, %‖ represent column percentages; p-values obtained from chi-square \ Fishers’ exact tests of association.
| Willing to undergo kidney transplant |   |   |   |
|-------------------------------------|---|---|---|
| Employed                            | 42 (28.57) | 105 (71.43) | 147 (42.98) |
| Retired                             | 29 (36.25) | 51 (63.75)  | 80 (23.39)  |
| **Wealth quintile**                 |   |   |   |
| 1st quintile                        | 29 (42.03) | 40 (57.97)  | 69 (20.18)  |
| 2nd quintile                        | 20 (28.99) | 49 (71.01)  | 69 (20.18)  |
| 3rd quintile                        | 25 (36.23) | 44 (63.77)  | 69 (20.18)  |
| 4th quintile                        | 22 (32.35) | 46 (67.65)  | 68 (19.88)  |
| 5th quintile                        | 16 (23.88) | 51 (76.12)  | 67 (19.59)  |
| **Social Support**                  |   |   |   |
| Low                                 | 40 (35.09) | 74 (64.91)  | 114 (33.33) |
| Medium                              | 32 (27.83) | 83 (72.17)  | 115 (33.63) |
| High                                | 40 (35.4)  | 73 (64.6)   | 113 (33.04) |
| **Dialysis**                        |   |   |   |
| Yes                                 | 24 (24.24) | 75 (75.76)  | 99 (28.95)  |
| No                                  | 88 (36.21) | 155 (63.79) | 243 (71.05) |
| **CKD stage**                       |   |   |   |
| stage 3                             | 8 (25.81)  | 23 (74.19)  | 31 (9.06)   |
| stage 4                             | 29 (46.03) | 34 (53.97)  | 63 (18.42)  |
| stage 5                             | 11 (33.33) | 22 (66.67)  | 33 (9.65)   |
| End stage on dialysis               | 64 (29.77) | 151 (70.23) | 215 (62.87) |
| **Has valid health insurance**      |   |   |   |
| Yes                                 | 92 (30.67) | 208 (69.33) | 300 (87.72) |
| No                                  | 20 (47.62) | 22 (52.38)  | 42 (12.28)  |
| **Preferred source of kidney**      |   |   |   |
| Deceased Kidney                     | 3 (50.00)  | 3 (50.00)   | 6 (1.75)    |
| Living Kidney                       | 28 (20.29) | 110 (79.71) | 138 (40.35) |

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; %§ represent row percentages, %‖ represent column percentages; p-values obtained from chi-square\Fishers’ exact tests of association.
### Willing to undergo kidney transplant

|                      | Yes (N/A) | No (Total) | N/A (Total) |
|----------------------|-----------|------------|-------------|
| N/A- I don't want a kidney | 32 (94.12) | 2 (5.88)   | 34 (9.94)   |
| No preference        | 49 (29.88)| 115 (70.12)| 164 (47.95)|
| Other regular income |           |            | 0.101       |
| Yes                  | 2 (13.33) | 13 (86.67) | 15 (4.39)   |
| No                   | 110 (33.64)| 217 (66.36)| 327 (95.61)|

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; %§ represent row percentages, %‖ represent column percentages; p-values obtained from chi-square/Fishers’ exact tests of association.

### Barriers to kidney transplant among participants unwilling to accept kidney transplantation

Among 63 participants who emphatically said *no* to accepting kidney transplantation, item response rates for questionnaire assessing perceived barriers to willingness to accept kidney transplantation was 100%. The respondents gave the following reasons as unimportant when deciding not to accept a kidney transplant: distrust for physicians (87.3%), need for more time to think and learn about it (76.2%), religious concerns (65.08%), concern about having somebody’s organ in their body (71.43%). Further, pain and fear of surgery was not an important reason for accepting kidney transplant in 47.6% of participants. Complications from transplant was very important to 39.7% of patients but unimportant to 38.1% of patients in deciding their unwillingness to accept a kidney transplant. Although financial constraint was not important to 49.2% of patients in their unwillingness to accept a kidney transplant it was very important for 30.2% of them (Table 2).

### Knowledge and attitude/views towards transplantation and kidney donation

Most of the participants (68.7%) reported to have previously heard about kidney transplant (Table 3).
Table 3  
Patient knowledge, attitude and perception by willingness to accept kidney transplantation

| Willing to accept kidney transplantation | No | Yes | Total | p-value |
|----------------------------------------|----|-----|-------|---------|
|                                        | N(%)§ | N(%)§ | N(%)¶ |         |
| Heard about kidney transplant (Prior knowledge) |       |       |       | <0.001*** |
| Yes                                    | 67 (26.38) | 187 (73.62) | 254 (74.27) |         |
| No                                     | 44 (53.01) | 39 (46.99) | 83 (24.27) |         |
| Don't Know/Not sure                    | 1 (20) | 4 (80) | 5 (1.46) |         |
| Physician discussed transplant with patient |       |       |       | 0.032* |
| Yes                                    | 24 (24.24) | 75 (75.76) | 99 (28.95) |         |
| No                                     | 88 (36.21) | 155 (63.79) | 243 (71.05) |         |
| Ever referred for transplant evaluation |       |       |       | 0.936 |
| Yes                                    | 12 (30.77) | 27 (69.23) | 39 (11.40) |         |
| No                                     | 99 (33.00) | 201 (67.00) | 300 (87.72) |         |
| Know/Not sure                          | 1 (33.33) | 2 (66.67) | 3 (0.88) |         |
| Self-reported knowledge on kidney transplant |       |       |       | 0.131 |
| Below average                          | 64 (37.87) | 105 (62.13) | 169 (49.42) |         |
| Average                                | 39 (27.27) | 104 (72.73) | 143 (41.81) |         |
| Above average                          | 9 (30) | 21 (70) | 30 (8.77) |         |
| Aware of transplant centers in Ghana   |       |       |       | 0.187 |

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; %§ represent row percentages, %¶ represent column percentages; p-values obtained from chi-square/Fishers’ exact tests of association.
|                                                               | Willing to accept kidney transplantation |                                                        |                                                        |                                                        |
|                                                               |                                           |                                                        |                                                        |                                                        |
|                                                               | Yes                                        | 18 (24)                                                | 57 (76)                                                | 75 (21.93)                                              |
|                                                               | No                                         | 91 (35.27)                                             | 167 (64.73)                                            | 258 (75.44)                                             |
|                                                               | Don't Know/Not sure                       | 3 (33.33)                                              | 6 (66.67)                                              | 9 (2.63)                                                |
| Feel need to know more about Kidney transplant                |                                             |                                                        |                                                        |                                                        |
|                                                               | Yes                                        | 58 (22.92)                                             | 195 (77.08)                                            | 253 (73.98)                                             |
|                                                               | No                                         | 46 (61.33)                                             | 29 (38.67)                                             | 75 (21.93)                                              |
|                                                               | Don't Know/Not sure                       | 8 (57.14)                                              | 6 (42.86)                                              | 14 (4.09)                                               |
| Willing to attend a class about kidney transplant             |                                             |                                                        |                                                        |                                                        |
|                                                               | Yes                                        | 57 (21.84)                                             | 204 (78.16)                                            | 261 (76.32)                                             |
|                                                               | No                                         | 42 (66.67)                                             | 21 (33.33)                                             | 63 (18.42)                                              |
|                                                               | Don't Know/Not sure                       | 13 (72.22)                                             | 5 (27.78)                                              | 18 (5.26)                                               |
| Know the level of kidney function when a transplant can be done|                                             |                                                        |                                                        |                                                        |
|                                                               | the kidney function                       | 1 (33.33)                                              | 2 (66.67)                                              | 3 (0.88)                                                |
|                                                               | after a patient                           | 4 (28.57)                                              | 10 (71.43)                                             | 14 (4.09)                                               |
|                                                               | I don't know                              | 107 (32.92)                                            | 218 (67.08)                                            | 325 (95.03)                                             |
| Willing to donate kidneys                                     |                                             |                                                        |                                                        |                                                        |
|                                                               | Yes                                        | 38 (17.76)                                             | 176 (82.24)                                            | 214 (62.57)                                             |

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; % represent row percentages, %§ represent column percentages; p-values obtained from chi-square\Fishers’ exact tests of association.
Twenty-nine percent of the total participants discussed kidney transplantation as an alternative to dialysis with their physician with 9.1% of the participants having ever been referred for kidney transplant evaluation. About nine out of every ten participants rated their knowledge about kidney transplantation as “below average” or “average”. Approximately one-third of the participants were unaware of any transplant centers in Ghana. In addition, about two-thirds of them feel they need to know more about kidney transplant (73.98%).

The proportion of participants who were willing to donate kidney if they had chance was 62.6% and most (81.3%) of the participants knew that a living person could donate a kidney. Majority (80.4%) of the

| Willing to accept kidney transplantation |   |   |   |
|----------------------------------------|---|---|---|
| No                                     | 48 (66.67) | 24 (33.33) | 72 (21.05) |
| Not sure                               | 26 (46.43) | 30 (53.57) | 56 (16.37) |

| Can a living person donate kidney | <0.001*** |
|----------------------------------|-----------|
| Yes                              | 61 (21.94) | 217 (78.06) | 278 (81.29) |
| No                               | 7 (77.78)  | 2 (22.22)   | 9 (2.63)    |
| Not sure                         | 44 (80)    | 11 (20)     | 55 (16.08)  |

| Perception of quality of life after kidney transplant | <0.001*** |
|-------------------------------------------------------|-----------|
| Incorrect                                              | 47 (60.26) | 31 (39.74) | 78 (22.81) |
| Correct (improve quality of life)                     | 65 (24.62) | 199 (75.38) | 264 (77.19) |

| Would you ask for a kidney donation | <0.001*** |
|------------------------------------|-----------|
| Yes                                | 61 (22.18) | 214 (77.82) | 275 (80.41) |
| No                                 | 51 (76.15) | 16 (23.88)  | 67 (19.59)  |

*p < 0.05, **p < 0.01, ***p < 0.001, N = frequency; %§ represent row percentages, %¶ represent column percentages; p-values obtained from chi-square/Fishers’ exact tests of association.
participants reported that they would ask for a kidney donation if there is the need to.

The likelihood of willingness accept a kidney transplant was associated with the following factors; *participants who had heard about kidney transplant, had discussed transplant with Physician, feel they need to know more about kidney transplant, willing to attend a class, willingness to donate kidneys, knew a living person can donate kidney, and those who would ask for a kidney donation* were significantly associated with willingness to undergo kidney transplantation. (p < 0.05) (Table 3).

**Predictors of patients’ willingness to accept kidney transplantation**

The multiple binary logistic regression model revealed that *willingness to attend a class about kidney transplant, willingness to donate kidneys, perception that a living person can a donate kidney, perception of quality of life after kidney transplant and whether one would ask for a kidney donation* as the significantly predictive factors of patients willingness to undergo kidney transplant (p < 0.05). From the model, patients who were *unwilling or Don't Know/Not sure of attending* a class about kidney transplant had 91% (aOR: 0.09, 95% CI: 0.01–0.63) and 98% (aOR: 0.02, 95%CI: 0.001–0.37) reduced odds of accepting to undergo kidney transplant compared to those who were willing to attend the class respectively. Similarly, patients who were not willing or not sure of donating kidney had 71% (aOR: 0.29, 95%CI:0.13–0.64) and 62% (aOR: 0.38, 95% CI: 0.16–0.91) lower odds of accepting kidney transplant compared to those who were willing to donate kidney if they had the chance respectively. Again, not Knowing/Not sure and not believing that a living person can donate a kidney was associated with 90% % (aOR: 0.10 95% CI: 0.04–0.27)) and 89% (aOR: 0.11, 95%CI: 0.02–0.76) lower odds of accepting to undergo kidney transplant compared to those who believe a living person can donate kidney respectively. Having the Perception of improvement in quality of life after kidney transplant was associated with about 3 times higher odds of accepting to undergo kidney transplant compared to those who perceived contrary to that (aOR: 3.11, 95%CI: 1.42–6.78). Patients who indicated that they would be able to ask someone if they need a kidney transplant had about 6 times higher odds of accepting to undergo kidney transplant compared to those who cannot (aOR: 5.82, 95%CI: 2.53–13.43) - Table 4.
Table 4
Determining factors of patients’ willingness to accept kidney transplant

| Sensitivity Analysis | Logistic regression | Penalized maximum likelihood logistic regression | Poisson regression |
|----------------------|---------------------|-----------------------------------------------|-------------------|
|                      | aOR (95% CI) | P-value | aOR (95% CI) | P-value | aIRR (95% CI) | P-value |
| Heard about kidney transplant (Prior knowledge) | | | | | | |
| Yes | 1 | 1 | 1 | | |
| No | 0.93(0.38–2.28) | 0.93(0.4–2.16) | 0.95(0.66–1.39) | | |
| Don't Know/Not sure | 1.81(0.12–27.37) | 1.36(0.13–14.23) | 1.06(0.35–3.22) | | |
| Physician discussed transplant with patient | | 0.809 | | 0.801 | | 0.912 |
| Yes | 1 | 1 | 1 | | |
| No | 1.1(0.51–2.36) | 1.1(0.53–2.26) | 1.02(0.75–1.38) | | |
| Feel need to know more about Kidney transplant | | 0.456 | | 0.614 | | 0.840 |
| Yes | 1 | 1 | 1 | | |
| No | 3.18(0.44–22.98) | 2.32(0.38–14.05) | 1.19(0.61–2.33) | | |
| Don't Know/Not sure | 6.19(0.18–214.6) | 3.69(0.14–96.66) | 1.19(0.36–3.97) | | |
| Willing to attend a class about kidney transplant | | 0.016* | | 0.034* | | 0.100 |
| Yes | 1 | 1 | 1 | | |
| No | 0.09(0.01–0.63) | 0.13(0.02–0.77) | 0.58(0.27–1.24) | | |

*p < 0.05, **p < 0.01, ***p < 0.001, CI: Confidence interval, aOR: Adjusted odds ratio, IRR: Incidence risk ratio, Background characteristics controlled for in the models were age, sex, dialysis status, insurance status, wealth quintile, religion, insurance status,
| Sensitivity Analysis                                                                 |
|-------------------------------------------------------------------------------------|
| **Don't Know/Not sure**                                                              | 0.02(0.001–0.37) | 0.03(0.001–0.59) | 0.4(0.11–1.37) |
| **Willingness to donate kidneys,**                                                   | 0.004**           | 0.005**          | 0.264          |
| **Yes**                                                                             | 1                  | 1                | 1              |
| **No**                                                                              | 0.29(0.13–0.64)   | 0.32(0.15–0.68)  | 0.7(0.45–1.11) |
| **Not sure**                                                                        | 0.38(0.16–0.91)   | 0.41(0.18–0.93)  | 0.84(0.56–1.25)|
| **Can a living person donate kidney**                                               | < 0.001***        | < 0.001***       | 0.015*         |
| **Yes**                                                                             | 1                  | 1                | 1              |
| **No**                                                                              | 0.11(0.02–0.76)   | 0.16(0.03–0.87)  | 0.45(0.11–1.87)|
| **Don't Know/Not sure**                                                             | 0.1(0.04–0.27)    | 0.13(0.05–0.33)  | 0.4(0.21–0.77)|
| **Perception of quality of life after kidney transplant**                           | 0.004**           | 0.007**          | 0.173          |
| **Incorrect**                                                                       | 1                  | 1                | 1              |
| **Correct**                                                                         | 3.11(1.42–6.78)   | 2.76(1.32–5.76)  | 1.32(0.89–1.96)|
| **Would you ask for a kidney donation**                                             | < 0.001           | < 0.001***       | 0.012*         |
| **No**                                                                             | 1                  | 1                | 1              |
| **Yes**                                                                             | 5.82(2.53–13.43)  | 4.83(2.19–10.65) | 1.99(1.16–3.42)|

*p < 0.05, **p < 0.01, ***p < 0.001, CI: Confidence interval, aOR: Adjusted odds ratio, IRR: Incidence risk ratio, Background characteristics controlled for in the models were age, sex, dialysis status, insurance status, wealth quintile, religion, insurance status,

**Discussion**

In this study, more than two-thirds of CKD patients were willing to accept kidney transplantation with those on dialysis and those who have insurance more likely to accept this treatment option. The proportion our CKD population willing to accept kidney transplantation is similar to study findings by Alansari et al. among haemodialysis patients in Saudi Arabia 67.3% vs 69%)(10). Similarly, a Nigerian
study among ESRD patients showed that 66.7% were willing to accept kidney transplantation (11). In contrast, the proportion willing to accept kidney transplantation in a study by Ilori et al. among African American population was lower (53.9%) (5). In another study among 239 haemodialysis patients in China, the proportion willing to accept kidney transplantation was even much lower (46.4%) (12). The differences observed may be attributed to variation in the study population, culture and socioeconomic characteristics.

The main factors which influenced patients’ willingness to accept this treatment include; willingness to attend a class on kidney transplantation, willingness to donate a kidney if they had the chance, perception that living person can donate a kidney and perception of improved quality of life after transplant. The important potential barriers for accepting kidney transplantation as a treatment option were complications of transplant surgery and financial constraints. Patients with CKD who indicated that quality of life improves after kidney transplantation were three times more likely to accept kidney transplant compared to those who answered no or were not sure. This shows that the benefits of improved perceived quality of life after transplant may play a major role in CKD patients’ decision to accept kidney transplantation. In this context, identifying and employing approaches to create awareness about the quality of life benefits of kidney transplantation early during the disease will help make early informed decision to promote better outcomes. Although, about 90% of CKD patients rated their knowledge level on kidney transplantation average or below average as much as two thirds will donate a kidney to someone who needs it. In addition, CKD patients who agree to attend a class on kidney transplantation were more likely to accept kidney transplantation as a treatment option. This indicates a positive attitude towards kidney transplantation and thus suggest that education will play a major role in improving their knowledge on kidney transplantation which can enhance their chances of accepting this treatment option when they develop or have ESRD.

Our study did not show a significant relationship between self-reported knowledge of kidney transplantation and willingness to accept kidney transplant as a treatment option, however nationwide studies involving large sample size may be required to assess the effect of CKD patients’ knowledge of kidney transplant on their willingness to accept this treatment.

Our study also revealed that, very few patients discussed kidney transplantation as a treatment option with their physicians and less than 10% were referred by their physicians for evaluation for kidney transplant. These findings show that physicians either do not initiate early discussion on kidney transplantation as a treatment option for ESRD or the quality of their discussions is not good enough to help patients make informed decisions. This may be due to the busy schedules of physicians who attend to large numbers of patients and therefore do not have the time to provide effective information on renal replacement therapy options. Again, these physicians may not have the requisite knowledge to effectively educate their patients on the treatment options available. Educating physicians to inform their patients about the options of kidney transplantation will help improve patients’ willingness to undergo kidney transplantation. Again, this calls for training of nephrologist and renal nurses through existing national
college progammes. Further promoting establishment of pre-dialysis clinics which is non-existent in our setting may be a useful step.

It is interesting to note that religious concerns were unimportant to most of the CKD patients in deciding not to accept a kidney transplant which is in sharp contrast to our study in the community involving non-CKD patients where religious beliefs was a strong barrier to kidney transplantation(13). This may suggest that people's opinion regarding kidney transplant when they are ill and desperate for cure or treatment may be different from decisions made when they are healthy.

The findings of perceived improved quality of life post-transplant is in congruence with that of Vamos et al. where improved self-rated health score was associated with positive attitudes towards kidney transplantation(14). This is in line with studies where improved health after transplant and decline in health on dialysis were strong motivations for positive attitudes towards kidney transplantation(15, 16). Again a study by Ilori et al. among African Americans CKD patients showed that improved quality of life post-transplant is motivation for CKD patients to accept kidney transplantation(5). Furthermore, the low knowledge of our CKD patient population was shown in a study by Alansari et al. in an observational study among haemodialysis patients(10) and was in agreement with a study by Ilori et al (5). This is further supported by a study in a population of stages 3 to 5 CKD patients revealed limited knowledge on treatment options for ESRD patients (17). To this end appropriate approaches to enhance positive attitudes towards willingness to accept kidney transplantation is needed. Previous studies have suggested using non-medical professional and alternative educational resources to educate patients to help enhance desired behaviour (18). Among participants with progressive chronic kidney disease, Boulware et al. used social worker groups and instructions through education to improve the likelihood of living donor kidney transplantation (18).

Among CKD patients who reported unwillingness to accept kidney transplant, a significant proportion considered complications of surgery and financial constraints as important barriers to accepting kidney transplantation as a treatment option. These findings can significantly influence their decision to accept kidney transplantation especially regarding cost of transplantation as the existing national health insurance scheme (NHIS) in Ghana does not cover renal replacement therapy. As a result, there is a need for governmental health agencies to consider subsidizing the cost of this ultimate treatment for kidney transplantation. This will promote the sustenance of the budding transplant programme in Ghana. Furthermore, NHIS should consider full or partial support for this treatment option of ESRD in Ghana. This is particularly important because majority of affected individuals are very young and form the productive workforce of society. In addition, there is a need for education to allay the anxieties of patients regarding the complications of surgery.

Several studies have shown a significant association between socio-demographic characteristics and willingness to accept kidney transplantation (12, 19–23). However, there was no such significant findings in our study which is similar to findings from other studies by Alansari et al. and Ilori et al. among haemodialysis patients and CKD outpatient not on dialysis respectively.(5, 10). Our study did not reveal
any significant association between willingness to accept kidney transplantation and mistrust for health professional in contrast to Ilori et al’s study where mistrust for health professionals was a hindrance to accepting this treatment option (5). This may be due to the fact that kidney transplantation discussions are not part of routine health related discussions in our part of the world due to its unavailability. Thus, there is a need for health authorities to include kidney transplantation discussions in routine health issues discussions thus prompting the need for training of health care workers on this issue.

This study has the following limitations; The study used a modified questionnaire with questions drawn from different studies due to the lack of standardized questionnaire for this study thus may affect the standard comparison of study results from other studies. However, such a study in a context where kidney transplantation is a budding treatment option for patients with ESRD has beneficence for health and social policy. It provides information on the perception of relatively young CKD population in a Low-to-Middle-Income Country (LMIC). Thus, these findings could inform future targeted innovative interventions to improve patient’s perception and their willingness to accept kidney transplantation.

**Conclusions**

The results of the present study highlight an area that has received little attention, but very important in understanding CKD treatment modalities in the subregion. More than two-thirds of CKD patients were willing to accept kidney transplantation. Facilitating factors for willingness to accept kidney transplant include willingness to attend a class on kidney transplantation, perception that living person can donate a kidney and perception of improved quality of life after transplant. The barriers to accepting kidney transplantation were perceptions of complications of transplant surgery and financial constraints. Improved population level educational strategies in a context where kidney transplantation is a new treatment option for patients with ESRD is imperative.

**Abbreviations**

CKD: Chronic Kidney Disease
ESRD: End Stage Renal Disease

**Declarations**

**Ethics approval and consent to participate**

This research was approved by the Korle-Bu Teaching Scientific and Technical Committee (STC) as well as the Institutional Review Board (IRB) with protocol identification number of KBTH-STC 000140/2018. All participants provided written consent to take part in the study.

**Consent for publication**
Not applicable

**Availability of data and material**

Data will be made available on request

**Competing interest**

Authors declare no conflict of interest

**Funding**

None

**Author contributions**

VB and VG were involved in the research design, performance of research, manuscript writing and data analysis. EY, DD and AMB and DF contributed to the design and manuscript writing. YA, MCC and NJ supervised all aspects of the work and edited the manuscript. All authors read and approved the manuscript.

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**Figures**

Figure 1

Willingness to accept kidney transplantation

**Supplementary Files**

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• QuestionnaireWTA.docx