Change in treatment coverage and barriers to mental health care among adults with depression and alcohol use disorder: a repeat cross sectional community survey in Nepal

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Abstract

Background

Despite the availability of evidence-based treatment, there is a substantial gap between the number of individuals in need of mental health care and those who receive treatment. The aim of this study was to assess changes in treatment coverage and barriers to mental health care among adults with depression and alcohol use disorder (AUD) before and after implementation of a district mental health care plan (MHCP) in Nepal.

Methods

The repeat population-based cross-sectional community survey was conducted with randomly selected adults in the baseline (N=1983) and the follow-up (N=1499) surveys, 3 years and 6 months apart. The Patient Health Questionnaire (PHQ-9) and Alcohol Use Disorder Identification Test (AUDIT) were used to screen people with probable depression and AUD. Barriers to seeking mental health care were assessed by using a standardized tool, the Barriers to Care Evaluation Scale (BACE).

Results

The proportion of the participants receiving treatment for depression increased by 3.7 points (from 8.1% in the baseline to 11.8% in the follow-up) and for AUD by 5.2 points (from 5.1% in the baseline to 10.3% in the follow-up study), however, these changes were not statistically significant. Significant reductions were found in the overall BACE score (p=0.004) and the specific BACE domains scores pertaining to financial barriers (p<0.001); stigma (p=0.004) and lack of support (p<0.001) among participants with depression. There was also a significant reduction between the baseline and follow-up in the overall BACE score (p=0.011) and the specific BACE domains scores pertaining to financial barriers (p<0.001) and lack of support (p<0.001) in the AUD group.

Conclusion

The study found a non-significant trend for improvements in treatment coverage but significant reductions in barriers to mental health care following implementation of the district mental health care plan. The possible areas for improvement in the current strategy to improve treatment coverage could include establishing a confidential place for consultation in each health facility, and targeted
community awareness programs to sensitize community members about mental health problems and
the availability of evidence-based treatment in primary and community health care systems.

Background
Globally, mental, neurological and substance use (MNS) disorders are among the leading causes of
disability, contributing to 10.4% of global disability adjusted life years (DALYs) [1]. MNS disorders are
also considered as significant risk factors contributing to pre-mature deaths [2], and often result in adverse social and economic consequences [3]. Among the MNS disorders, depression and alcohol
use disorder (AUD) are reported to be the second and third leading causes of years lived with
disability [4-6]. While, there is an increasing evidence base of cost-effective interventions for mental
health problems, it is reported that more than half (56%) of people with depression [7] and 87%
people with alcohol abuse and dependence do not receive any treatment [8]. The most common factors hindering mental health care utilization included low perceived needs, stigma and
discrimination associated with mental illness, lack of awareness about the available services, inability
to afford the treatment cost and lack of effective treatment [9-13].

In Nepal, few studies have been conducted in the area of mental health. Most of the prior studies
have focused on estimating prevalence of mental health problems, particularly the mental health
problems of populations affected by conflict and other humanitarian crises. The available data shows
a wide range of reported prevalence of depression (14.0% to 80.0%), anxiety (22.9% to 81.0%), and
posttraumatic stress disorder (PTSD) (3.0%% to 60.0%) [14-16]. Few studies have attempted to estimate treatment coverage for mental health care among individuals suffering from such disorders. A recent study conducted among adults in Chitwan district (southern Nepal), however, reported a very large treatment gap for depression (91.5%) and alcohol use disorder (94.9%) [17]. The most commonly reported barriers to treatment were inability to afford care, fear of being perceived as weak for having mental health problems, fear of being perceived as crazy and being too unwell to ask for support [18].

Over the past decade, several initiatives have been taken globally to minimize the treatment gap for mental health problems. The PProgramme for Improving mental health care (PRIME), a research
program consortium aims to minimize the enormous treatment gap on mental health care by generating new evidence on implementation and scaling up of mental health programs in primary and maternal health settings in low and middle-income countries (LMICs) [19]. As part of PRIME, a district mental health care plan (MHCP) was developed and implemented in Chitwan. The MHCP consists of intervention packages delivered at community, health facility and health organization platforms [20]. The evaluation of the PRIME district mental health care plan was carried out using multiple methods which included measuring change in population level treatment contact coverage; change in detection and initiation of evidence-based treatment, and change in health and socio-economic outcomes of people receiving treatment from primary health clinics [21, 22]. A community survey was conducted before and three years after implementation of the PRIME MHCP to assess the changes in population-level contact coverage and barriers to seek mental health services. The overall aim of this paper is to report on the change in treatment coverage and barriers to mental health care among adults with depression and alcohol use disorder before and three years after implementation of PRIME in Chitwan Nepal.

Methods

Setting

Nepal is one of the poorest countries in south Asia, and has a total population of approximately 26.4 million with 69.1 years life expectancy at birth. Nepal’s gross national income per capita at purchasing power parity (PPP) was $2500 in 2017, ranking 193, out of 226 countries [23]. The study was conducted in Chitwan, a district in southern Nepal. The total population of Chitwan district is 579,984 (279,087 male and 300,897 female), with approximately 132,462 households. On average, 4.38 people live in each household in the district. The literacy rate of Chitwan is 78.9%, which is higher than the national average of 67% [24]. Although mental health services are restricted to a few hospitals located in big cities in Nepal; in Chitwan mental health services (both inpatient and outpatient services) are available in the district hospital and private medical colleges operating in the district.

Study design
We used a repeat population-based cross-sectional survey design to assess the change in treatment contact coverage and barriers to mental health care among adults with depression and alcohol use disorder. The baseline community survey was conducted between May and July 2013 (before the implementation of the PRIME MHCP) and the follow-up community survey was conducted between December 2016 and February 2017 (three years after the start of the implementation of the PRIME MHCP).

**Sampling and sample size**

Two different samples were recruited for the baseline and follow-up surveys. Sample size was calculated to allow detection of a change in contact coverage between the baseline and the follow-up study with 80% statistical power and two-sided alpha of 0.05 [17]. The estimated contact coverage for depression and AUD in the baseline was between 0 to 5%, and hypothesized to increase to between 20 to 30% at the end-line. The estimated sample size for both baseline and follow-up surveys was 1500.

Participants were recruited from 10 Village Development Committee (VDCs) of Chitwan district. VDCs are the lowest administrative units in a district covering a population size of 5000 to 25,000. Households were used as the sampling unit for the surveys, and the same multi-stage random sampling technique was used to recruit participants at baseline and in the follow-up study. First, the total sample size was divided into 90 wards (9-wards in each VDC based on the proportion of the total population of each ward. Second, the required numbers of households from each ward were selected using a systematic random sampling technique. For this purpose, we prepared a list of all households (with the name of head of households) for each of the 90 wards. We calculated a sampling frame for each ward using the proposed sample size and total households of a particular ward. At the end, we selected the required number of households by using the calculated sampling frame. Finally, the research assistants selected one adult from each household by using simple random selection procedure. The field workers first prepared a list (roster) of all the members living in each household. A member of each household drew a name of one eligible participant from within that household. If no one was found at the household after three visits, or the selected adult was not willing to participate
in the study then the research assistant visited the nearest neighbouring household to assess its members for the inclusion criteria. In total, we recruited 1983 and 1499 adults in the baseline and the follow-up study, respectively.

**Participants and procedure**

The inclusion criteria were age 18 years or above, resident of the study VDCs, ability to provide informed consent and fluency in the Nepali language. The exclusion criteria included having severe mental illness and unable to provide informed consent. Twelve Nepali-speaking research assistants having with an undergraduate degree were hired for data collection. Research assistants visited each sampled household, assessed eligibility criteria, performed sampling procedures within the household, and obtained informed consent from the selected participants for the interview. Interviews were conducted in the respondents’ place of residence by using Android tablets with questionnaire application. The research assistants provided information about the survey in both oral and written format prior to the recruitment of the participants. The selected literate adults then signed the consent form to participate in the study. The study was approved by Nepal Health Research Council (NHRC), the national ethical body of the government of Nepal; ethical review board of World Health Organization (WHO) Geneva, and University of Cape Town.

**Instruments**

Standardized and validated instruments were used to screen people with depression and AUD and to assess barriers to mental health care. We have described each of the study measures in detail below.

*Demographic characteristics:* Basic socio-demographic characteristics of the respondents such as age, sex, education, caste/ethnicity, marital status, religion, occupation, and family income were collected for each of the study participants in both baseline and follow-up study.

*Patient Health Questionnaire (PHQ9):* The PHQ9 was used to screen people with depression. PHQ9 is a widely used self-report screening tool for patients with depression in various medical settings [25]. The PHQ9 has nine common symptoms of depression and respondents are asked to score those symptoms based on their experiences in the past two weeks. The PHQ9 has been translated and validated in Nepal [26]. The validated cut off score of ≥10 (sensitivity =0.94, specificity =0.80) has
been recommended for moderate to severe depression symptoms [26]. In addition to the PHQ9, we also asked an additional question to assess depressive episodes in the past 12-months period. We considered those with an affirmative response to the additional question or a score of 10 or more on the PHQ9 to have depressive disorder.

**Alcohol Use Disorder Identification Test (AUDIT):** The AUDIT has been used to screen people with alcohol abuse or dependence. The AUDIT is a 10 item tool developed by the World Health Organization (WHO) to assess alcohol consumption, drinking behaviours, and alcohol related problems among people presenting with current symptoms or symptoms over the past one year [27]. AUDIT has been translated, adapted and validated in Nepal. A cut off score of 9 or more has been recommended for alcohol dependence or alcohol abuse for both males (sensitivity 0.97 and specificity 0.92) and females (sensitivity 0.94 and specificity 0.91) [28].

**Barriers to Access to Care Evaluation (BACE):** Barriers related to stigma and discrimination and other non-stigma related barriers were assessed using the BACE scale, which was developed by involving both experts and service users at Kings College London [29]. The BACE is a 30-item self-report instrument where respondents are asked whether each of the items has ever stopped, delayed or discouraged them for receiving or continuing care for their mental health problems. It has a four-point response scale ranging from 0 (not at all) to 3 (a lot) along with ‘66’ for non-applicable responses. The total score of BACE ranges from 0 to 90; a higher score indicates more barriers. We followed a systematic approach that has been developed in Nepal for translation and adaptation of standardized tool for translation and contextualization of BACE in Nepal [30].

**Treatment contact coverage:** Respondents who had reported depressive episodes in the past 12 months or a score of 10 or more on the PHQ9 or score of 9 or more on the AUDIT were subsequently asked whether they had sought treatment for that disorder in the past one year. Based on the framework described by Tanahashi [31], contact coverage was defined as the proportion of individuals with depression or AUD who accessed any health care providers for that condition in the past 12 months. Health care providers were disaggregated into mental health specialists, generalists, primary health care workers and other community-based care providers.
**Statistical analysis**

Data were transferred from the online data collection application [32] to Stata version-13, where data were cleaned. First, we described the demographic and screening-related characteristics of the participants who were recruited into the baseline and follow-up survey. As all socio-demographic variables were categorical, we presented numbers and proportions, and used Chi-square tests to compare demographic characteristics in the baseline and follow-up survey. We also used Chi-square tests to assess if the change in the proportion of the participants who accessed mental health care (treatment contact coverage) differed between the baseline and follow-up survey. Chi-square tests were conducted separately for participants with depression and AUD. To assess changes in barriers to seeking mental health care from baseline to follow-up, we compared the overall scores on the BACE scale, and scores on BACE sub-scales (i.e. stigma, financial barriers, cultural beliefs and practices, low perceived needs, perceived ineffectiveness of available services, lack of support, and lack of knowledge) between baseline and follow-up surveys. As the BACE data were not normally distributed, non-parametric Mann-Whitney U Test was used separately for depression and AUD. Finally, unadjusted logistic regression analysis was performed to assess the association between ‘help seeking’ behaviour and barriers to mental health care in the baseline survey. As the number of people receiving treatment for depression and AUD was relatively small, both disorders have been combined for regression analysis.

**Results**

Table 1 presents socio-demographic characteristics of the participants involved in the baseline and the follow-up surveys. The proportion of female participants in the follow up survey (n=1072, 68.3%) was greater than that at baseline (n=1280, 60.1%; $\chi^2=18.3$, p<0.001). More than two-thirds of the sample in both baseline (n=1418, 68.1%) and follow-up survey (n=1089, 69.5%) were of working age (25 to 59 years); married (baseline, n=1645, 81.5% and follow up, n=1253, 82.8%) and Brahmin/Chhetri (baseline, n=948; 48.3% and follow up, n= 772, 51.5%). A large majority of the participants in the follow-up survey (n=1351; 90.4%) were from the households with sufficient family income for foods for 9 to 12 months; this proportion was significantly greater than that at baseline.
(n=1324; 67.8%, χ²=126.0, p<0.001). The prevalence of depression in the follow-up survey (n=118; 7.6%) was significantly lower than that found at baseline (n=228; 11.1%, χ²=9.3, p=0.002).

Table 1 Socio-demographic characteristics of the participants in the baseline and follow-up surveys

| Variables | Baseline (N=1983) | Follow-up (N=1499) |
|-----------|------------------|-------------------|
|           | N*   | %    | N* | %  |
| Sex       |      |      |     |     |
| Male      | 703  | 39.9 | 427 | 31.7 |
| Female    | 1280 | 60.1 | 1072 | 68.3 |
| Age (years) |      |      |     |     |
| 18-24     | 296  | 18.4 | 221 | 17.1 |
| 25-59     | 1418 | 68.1 | 1089 | 69.5 |
| 60 and above |  269 | 13.5 |  189 | 13.3 |
| Education |      |      |     |     |
| Not schooling | 275 | 13.2 | 176 | 11.8 |
| Literate/less than primary | 315 | 14.9 | 304 | 19.9 |
| Primary   | 360  | 17.6 | 381 | 22.7 |
| Secondary | 822  | 41.6 | 518 | 36.1 |
| College/University | 211 | 12.7 | 120 | 9.5 |
| Marital status |      |      |     |     |
| Single    | 215  | 13.6 | 135 | 10.7 |
| Married   | 1645 | 81.5 | 1253 | 82.8 |
| Others (widow/divorced/separated) | 123 | 4.9 | 111 | 6.5 |
| Caste/Ethnicity |      |      |     |     |
| Brahmin/Chhetri | 948 | 48.3 | 772 | 51.5 |
| Janajati  | 542  | 27.4 | 388 | 25.3 |
| Dalit     | 308  | 15.0 | 229 | 13.7 |
| Others    | 185  | 9.3  | 110 | 9.5 |
| Religion  |      |      |     |     |
| Hindu     | 1604 | 80.3 | 1239 | 82.4 |
| Non-Hindu | 379  | 19.7 | 260 | 17.6 |
| Occupation |      |      |     |     |
| Agriculture | 1335 | 64.2 | 839 | 55.6 |
| Service/Business | 297 | 15.5 | 204 | 13.5 |
| Students/Unemployed | 244 | 15.0 | 384 | 26.2 |
| Others    | 107  | 5.3  | 72  | 4.8 |
| Family income sufficient to manage foods for the period of |      |      |     |     |
| Up to six months | 352 | 16.8 |  29 |  1.7 |
| 6 to 9 months | 307 | 15.4 | 119 |  7.9 |
| 9-12 months or above | 1324 | 67.8 | 1351 | 90.4 |
| Clinical characteristics |      |      |     |     |
| Screen positive on PHQ-9 | 228 | 11.1 | 118 | 7.6 |
| Screen positive on AUDIT | 96 | 5.0  | 74  | 4.9 |

* %, sample weighted percent; N, non-weighted sample size

**Treatment coverage**

Table 2 presents percentages of the participants who had sought treatment from a specialist, generalist, or other health care providers for symptoms related to depression and alcohol use disorder in the last one-year period. Some of these results have already been published elsewhere [22]. Of the total 118 participants with depression in the follow-up survey, 11.8% (n=13) reported that they had
received treatment from any providers in the past 12 months; this proportion was greater but not significantly different from the proportion reported at baseline (n=18; 8.1%; χ²=1.02, p=0.424).

Similarly, the proportion of the participants receiving treatment for AUD from any providers in the follow-up survey (n=9; 10.3%) was greater than, but not significantly different from, that found at baseline (n=5; 5.1%; χ²=1.678, p=0.235). There were no significant differences in the proportions of the participants receiving treatment from either mental health specialists or generalists health workers (e.g. medical doctors, health assistants) for both depression and AUD between baseline and follow-up surveys (Table 2).

Table 2 Help-seeking behavior of people with depression or alcohol use disorder in the baseline and follow-up surveys

| Types of providers | Depression | AUD** |
|--------------------|------------|-------|
| Receiving treatment in the past year from any providers | Baseline (N=228) n (%) | Follow-up (N=118) n (%) | χ² | P-value | Baseline (N=96) n (%) | Follow-up (N=74) n (%) |
| Generalists (e.g. Doctors and PHC workers) | 5 (1.8) | 4 (4.2) | 1.168 | 0.281 | 2 (1.3) | 3 (3.2) |
| Mental health specialists (e.g. psychiatrists, psychologists) | 9 (3.6) | 8 (5.6) | 0.673 | 0.413 | 0 | 1 (1.6) |
| Others (Traditional healers, religious leaders) | 8 (4.2) | 5 (5.2) | 0.082 | 0.774 | 4 (4.5) | 3 (3.6) |

* %, sample weighted percent; n, non-weighted frequency  
** includes both men and women

Barriers for mental health care

Results showed a significant reduction in the overall BACE score from baseline (median=34; IQR=25-43) to follow-up among participants with depression (median=30; IQR=22-36; U=2.94; p=0.004).

There was also a significant reduction on BACE sub-scores pertaining to financial barrier (median= 4; IQR= 2-5 at baseline and median= 3; IQR= 2-4 at follow up; U= 4.41; p<0.001); stigma (median= 14;
IQR= 10-19 at baseline; median= 12; IQR 8-16 at follow-up; U= 2.89; p=0.004) and lack of support (median= 3; IQR= 2-5 at baseline; median= 3; IQR= 1-3 at follow-up; U= 3.59; p<0.001). There was a significant increase in the median scores on the knowledge about the available services subscale (median= 1; IQR= 1-2 at baseline; median= 1; IQR= 1-2 at follow-up; U= -2.10; p<0.036). For the AUD group, a significant reduction was found in the overall BACE score (median=32; IQR=20-42 at baseline and median=26; IQR=16-33 at follow up; U=2.53; p=0.011); financial barrier subscale (median, 3; IQR, 2-5 at baseline and median, 2; IQR 1-3 at follow up; U, 4.11; p<0.001), as well as scores on the lack of support subscale (median, 3; IQR, 1-4 at baseline and median, 2; IQR 1-3 at follow-up; U, 3.48; p<0.001). We also found a decrease in the stigma score (median=13; IQR=8-18 at baseline; median=11; IQR=6-14 at follow-up) but the difference was marginal (U=1.9; p=0.057) (table 3).

Table 3 BACE overall and subscale scores in the baseline and follow-up surveys

| BACE overall and subscales (Number of items) | Baseline | Follow-up |
|---------------------------------------------|----------|-----------|
|                                             | Median   | IQR       | Median   | IQR       | U     |
| **Depression**                              |          |           |          |           |       |
| Overall BACE (30)                           | 34       | 25-43     | 30       | 22-36     | 2.91  |
| Stigma (12)                                 | 14       | 10-19     | 12       | 8-16      | 2.89  |
| Financial barriers (3)                      | 4        | 2-5       | 3        | 2-4       | 4.41  |
| Cultural practices and beliefs (4)          | 3        | 2-4       | 3        | 2-4       | 1.83  |
| Low perceived needs (4)                    | 4        | 3-6       | 5        | 3-6       | -1.05 |
| Lack of knowledge about available services (1) | 1    | 1-2       | 1        | 1-2       | -2.10 |
| Perceived ineffectiveness of services (3)   | 3        | 1-4       | 2        | 1-3       | 1.58  |
| Lack of support (3)                         | 3        | 2-5       | 3        | 1-3       | 3.59  |
| **AUD**                                     |          |           |          |           |       |
| Overall BACE (30)                           | 32       | 20-42     | 26       | 16-33     | 2.53  |
| Stigma (12)                                 | 13       | 8-18      | 11       | 6-14      | 1.90  |
| Financial barriers (3)                      | 3        | 2-5       | 2        | 1-3       | 4.11  |
| Cultural practice and beliefs (4)           | 3        | 2-4       | 3        | 2-3       | 1.46  |
| Low perceived needs (4)                    | 4        | 2-6       | 4        | 2-5       | 0.72  |
| Lack of knowledge about available services (1) | 1    | 1-2       | 1        | 1-2       | 0.72  |
| Perceived ineffectiveness of services (3)   | 2        | 1-3       | 1        | 0-3       | 0.74  |
| Lack of support (3)                         | 3        | 1-4       | 2        | 1-3       | 3.48  |

**Factors associated with help seeking behavior and barriers for mental health care**

The association between help seeking behaviours of people with depression or alcohol use disorder
and barriers for mental health care are presented in Table 4. Results show that the financial barrier is significantly associated with help-seeking behavior at baseline: participants reporting more financial barrier had lower odds of receiving mental health treatment in the 12 months preceding the survey (OR=0.76; CI=0.59 – 0.99; p=0.042). Likewise, participants experiencing greater lack of support were less likely (OR=0.78 and CI=0.61 – 1.01) to receive care than their counterparts who reported greater support, though the difference was marginal (p=0.063) (table 4).

Table 4 Association between help seeking behaviour and barriers for mental health care in the baseline survey

| Barriers to mental health care                  | Received treatment in the past 12 months | Odds ratio (95% CI) |
|------------------------------------------------|----------------------------------------|---------------------|
|                                                 | No [Mean (SD)] | Yes [Mean (SD)]    |                      |
| Overall BACE                                    | 32.1 (13.3)     | 27.6 (10.6)        | 0.97 (0.94 – 1.01)  |
| Stigma                                         | 13.6 (6.6)      | 11.6 (6.5)         | 0.96 (0.98 – 1.01)  |
| Financial barriers                             | 3.6 (1.8)       | 2.8 (1.2)          | 0.76 (0.59 – 0.99)  |
| Low perceived needs                            | 4.2 (2.3)       | 4.0 (2.2)          | 0.96 (0.80 – 1.14)  |
| Cultural practice and beliefs                  | 3.0 (1.6)       | 2.4 (1.2)          | 0.78 (0.58 – 1.03)  |
| Lack of support                                | 3.1 (1.9)       | 2.3 (1.5)          | 0.78 (0.61 – 1.01)  |
| Lack of knowledge about available services     | 1.3 (0.96)      | 1.1 (1.0)          | 0.81 (0.52 – 1.27)  |
| Perceived ineffectiveness of services          | 2.3 (1.7)       | 2.0 (1.5)          | 0.90 (0.70 – 1.16)  |

Discussion

This study assessed changes in treatment coverage and barriers to mental health care among people with depression and AUD in Chitwan, Nepal. The study revealed a very large treatment gap in both baseline and the follow-up survey for depression (91.9% at baseline and 88.2% at follow-up) and AUD (94.9% at baseline and 89.7% at follow-up). The proportion of the participants receiving treatment for both depression and AUD increased at the follow-up survey but the changes were not statistically significant. Due to lack of sufficient data on population level contact coverage in the context of interventions, possibilities for comparison are limited. The treatment contact coverage for depression reported in the follow-up survey was much smaller than that found in the cross-sectional studies in the LMICs. For example, studies conducted in 10 LMICs as a part of WHO world mental health survey initiatives reported that 52.6% of people with a need for depression care had contacted any service provider in the past 12 months [33]. Similarly, the reported contact coverage for depression in the follow-up study was also smaller than that found in nationally representative studies in South Africa (15.3%) [34], Central India (23.5%), Ethiopia (23.7%) [17] and Northern India (21%) [35]. However,
the treatment contact coverage reported in the follow-up survey was larger than that found in China (3.4%) [36], Korea (6.1%) [37]; Nigeria (1.6%); Colombia (5.5%) and Ukraine (7.2%). Similarly, the treatment contact coverage reported for AUD in the follow-up survey was smaller than that found in Ethiopia (13.1%) [38]; however, this was larger than that found in central India (2.8%), Uganda (3.5%) [17] and South Africa [34]. Few studies have investigated the change in treatment contact coverage on mental health care in the LMICs. The available studies demonstrated mixed findings on the effectiveness of community mental health programs in increasing treatment contact coverage. For example, a study conducted to evaluate an integrated mental health program in India and Pakistan showed a significant improvement in the treatment contact coverage on mental health care in India[39]; however, the results were not promising in Pakistan [39]. The treatment contact coverage for depression increased 6-times (i.e. 4.3% in the baseline to 27.2% in the endline) in an 18-month interval community survey conducted as part of VISHRAM (Vidarbha Stress and Health Programme) project in central India [40].

Despite the efforts made at community by PRIME to sensitize the general community on mental health issues, increased availability of mental health services in the health facilities, engagement of FCHVs on detection and referral of people with mental illness and anti-stigma programs, the proportion of the participant receiving services reported in the follow-up survey is smaller than anticipated. This is especially the case given the significant reductions in barriers to care, including financial barriers, stigma and lack of support for both depression and AUD groups in the follow-up survey. Likewise, the CIDT, which was developed to facilitate detection of people with probable mental health problems in the community, has shown to increase help seeking behaviour among people in the same community in Chitwan [41]. Similarly, the ability of trained primary health care workers to detect mental health problems in the health facilities also increased significantly after the introduction of the mhGAP-based training program [22]. The possible reasons for not achieving a significant changes in the treatment contact coverage could be explained by the small number of people screened positive for depression and AUD, that was not sufficient to detect population level change in treatment contact coverage. Another important possible explanation for non-significant
improvements in the treatment coverage could be explained by the distal nature of the outcome in relation to the intervention. This is borne out by the fact that the district MHCP did show a significant increase in the number of people utilizing services over time [22].

The results demonstrated a significant reduction in the overall BACE score and the specific BACE domains scores pertaining to stigma, financial barriers and lack of support in both depression and AUD groups. The significant reduction in the financial barriers reported at follow-up survey could be explained by the fact that all services included in the PRIME MHCP (including psychotropic medicines) were offered free of cost. Similarly, involvement of FCHVs in detection, referral and homebased care could be an important factor leading to a significant reduction in barriers related to lack of support to get services. Community awareness and sensitization program could have played important roles for reducing stigma related barriers, especially perceived barriers to mental health care. Our findings are in keeping with the available data, demonstrating that community sensitization programs including public campaign and social contacts, are an effective strategy to change attitudes and behaviours related to mental illness and reduce stigma related to help-seeking [42-44]. Our results are consistent with the study conducted in Andra Pradesh, India, where they found significant improvements in stigma related to help-seeking behaviours after implementation of the community level awareness programs [45]. Our results are also consistent with the study conducted in Rawalpindi, Pakistan and Bangalore, India, where a significant reduction was reported in financial barriers and stigma-related barriers three months after implementation of community based mental health programs especially being embrassed to received services [39].

The findings of this study may have several implications to improve access to mental health services through primary and community health care systems in Nepal. First, the results demonstrated that the proportions of the participants receiving mental health services increased at the follow-up survey after introducing the evidence-based treatment program in primary and community health care system, although this change was not statistically significant. Considering the huge population-wide coverage of primary health care services in Nepal, integration of mental health services into primary and community health care system could be a potential strategy to reduce the alarming treatment
gap in mental health care in Nepal. Second, despite the efforts made at the community level to minimize barriers to mental health care, the results demonstrated that there was no significant change in the barriers related to perceived effectiveness of the mental health services, cultural beliefs and practices and low perceived needs in both depression and AUD groups. The content included in the existing community sensitization program may not have been sufficient to convince people with mental illness about the needs, and effectiveness of the available mental health services. Therefore, the content of the existing community sensitization program may need to be revised and additional contents related to effectiveness of the available mental health services included. A third implication of our study is towards improving infrastructure and quality of the available services in primary care. In general, most of the primary health care facilities in the study sites lack separate and confidential rooms for consultations. Due to a huge stigma and discrimination associated with mental illness, people generally do not want to share their problems in front of other people. This has also been supported by the proportion of the participants reporting a high level perceived stigma in the follow-up survey. Moreover, lack of confidential places in the primary health care facilities was reported to be one of the important barriers for improving demand side barriers on mental health care in the formative study [46]. Therefore, a separate and confidential place should be made available in each health facilities for consultation. Finally, the results demonstrated significant reduction in major barriers to mental health care such as stigma, financial barrier and lack of support at follow-up survey in both depression and AUD groups, however, more and other barriers, potentially non-assessed barriers might need to be overcome to further increase greater help-seeking behavior. Therefore, further research, mainly a qualitative study, is recommended to investigate why people with depression and AUD do not seek services even the services are made available free of cost in their own community.

This study has limitations that may have impacted our comparisons pre- and post-service initiation. First, we found a low proportion of male participants in both baseline and the follow-up survey, which could be explained by a high out-migration of the adult male population in the study areas. The recent census recorded an absent population of 7.3% i.e. 1,921,494, of which 87.6% were male and
12.4% were female [47]. Similarly, a significantly larger proportion of participants in the follow-up survey were from the households with sufficient family income for foods for 9 to 12 months compared to baseline. This might have impacted on the difference identified in help seeking behaviours of the participants from baseline to follow-up. Second, the prevalence of people screening positive for depression and AUD in both surveys was relatively lower than anticipated [17], and so we had less than 80% statistical power to detect a 20% change in treatment-seeking. Third, the PHQ9 which was used to screen people for depression has approximately 4-6 false positive per 10 patients screening positive for depression with fewer than one per 100 false negatives while using a cut-off score of 10 or above with 0.94 sensitivity and 0.80 specificity [26]. Fifth, due to the lack of data on exposure to PRIME community level intervention, we cannot conclude that the change reported in the treatment contract coverage was due to PRIME interventions.

Conclusion
This is, to the best of our knowledge, the first study conducted to assess changes in treatment coverage and barriers to mental health care in Nepal for people with probable depression and AUD. The study found a non-significant trend for improvements in population level treatment coverage following implementation of the district mental health care plan. Furthermore, the results demonstrated a significant reduction in barriers to mental health care before and after implementation of the district mental health care plan. There was a significant reduction in the overall BACE score, and the specific BACE domains scores pertaining to financial barriers, stigma and lack of support in the follow-up survey for both depression and AUD. This might have been the result of some specific MHCP components such as free services, community informant detection tool and anti-stigma programs. Despite the significant reduction in barriers to mental health care in the follow-up survey, this did not translate into significant change in population level treatment coverage. In a separate study, a significant increase was reported in the number of people utilizing services overtime [22]. The reduction in barriers could have a significant impact to increase in the number of people utilizing services. The possible reasons for non-significant changes in treatment coverage could be that the method of repeat population level surveys with a random sample was too distal to the intervention to
be able to register a change and that the study may have been underpowered to detect such changes. The key areas for improvement in the current strategy to improve treatment coverage included establishment of a confidential place for consultation in each health facility, and targeted community awareness programs to sensitize community members on mental health problems, mental health services available in the district and communities, and effectiveness of the treatment provided by trained care health workers.

Abbreviations
AUD: Alcohol use disorder
AUDIT: Alcohol use disorder identification test
BACE: Barrier to care evaluation scale
CIDT: Community informant detection tool
FCHV: Female community health volunteers
LMIC: Low and middle income countries
MHCP: Mental health care plan
NMS: Mental, neurological and substance use disorder
PHC: Primary health care
PRIME: Programme for improving mental health care
PHQ: Patients health questionnaire
VDC: Village development committee
WHO: World health organization

Declarations
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**Availability of data**

Interested parties may notify the PRIME investigators of their interest in collaboration, including access to the data set analyzed here, through the following website: http://www.prime.uct.ac.za/contact-prime.

**Authors’ contribution**

NPL, ECG, MJDJ and CL conceptualized the study

NPL collected data

NPL and ECG lead the data analysis

NPL drafted original manuscript

NPL, ECG, MJDJ and CL contributed to the discussion, interpretation and reporting of the findings

All authors read and approved the final manuscript

**Ethics approval and consent to participate**

The PRIME community surveys received ethical and technical approval from Nepal Health Research Council (NHRC) (Ref. no. 10/2013), the national ethical body of the government of Nepal; ethical review board of World Health Organization (WHO) Geneva, and University of Cape Town (HREC Ref: 412/2011). Written and oral information was provided to each of the study participants about the objectives and process of the study. Participants provided a signature to confirm their participation. Only those people who voluntarily agreed to participate were included in the surveys.

**Consent for publication**

Not applicable

**Competing interest**

The authors have declared that no competing interests exist.

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