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Tracing patients lost-to-follow-up on antiretroviral treatment in an urban slum: Experience from a partnership between an HIV-Clinic and a Non-Governmental-Organization Network in Mumbai, India

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Conflict of interest statement

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51 We declare that we have no conflict of interest.
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ABSTRACT

Aim

This paper describes a cooperative initiative between an HIV-clinic and non government organization network providing lost-to-follow-up tracing and delayed appointment follow-up of patients on antiretroviral treatment.

Background

Loss-to-follow-up among patients on antiretroviral treatment is a major challenge in resource-constrained settings. A model of cooperation between a Médecins Sans Frontières HIV-clinic and a non-governmental-organisation network was piloted in a Mumbai slum. A steady decline in delayed appointments and loss-to-follow-up was observed over a four years period.

Methods

A mixed-method study conducted in January 2011 explored potential reasons for declining loss-to-follow-up-rates. A retrospective, quantitative analysis of patient data was undertaken complemented by 22 semi-structured interviews, four focus-group discussions to explore patients' and providers' perceptions of tracing activities.

Results/Findings

The clinic loss-to-follow-up-rate has steadily declined from mid 2008 to 2011. Thirty-eight (4.6%) of 819 patients registered during the period were lost-to-follow-up with most lost during the first year. Rates of loss-to-follow-up between 0.3-2.4% were observed over the last two years. Phoning the day before an appointment was perceived as the most useful intervention to avoid missing appointments. The analysis revealed a widespread fear of forced disclosure by patients during home visits.

Conclusions

The low **loss-to-follow-up-rate** cannot be attributed to the network tracing activities alone.

Phoning before appointments may result in fewer delayed appointments and prevent **loss-to-follow-up**. Home visits should be a last resort method of patient tracing because of the risk of HIV-status disclosure and the possibility of discrimination from family and neighbours.

Key Words: HIV/AIDS, Loss-to-Follow-Up, Nursing, HIV Disclosure, Patient tracing, Discrimination, Resource-limited settings

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SUMMARY STATEMENT

What is already known about this topic

- Loss-to-follow-up among patients on antiretroviral treatment is a major programmatic challenge in both rich and resource-constrained settings.
- There is a dearth of proven models and interventions for improving HIV patient retention in care, even less from resource-limited settings, especially urban slums.

What this paper adds

- Low **loss-to-follow-up** rates can be achieved and maintained in small and medium scale HIV-programs in an urban slum setting.
- A cooperative initiative between an HIV Clinic and a Non Governmental Organisation network to provide **loss-to-follow-up** tracing of patients **on antiretroviral treatment** is a promising model; however it may only be a contributing factor to keeping patients in care, rather than the main reason.
- Home visits should be kept at a minimum in a slum setting to avoid the high risk of HIV status exposure and lasting discrimination.

Implications for practice and/or policy

- A model using community peer support for HIV patients appeared to result in a low **loss-to-follow-up** rate among urban **slum** dwellers in Mumbai and should be considered in similar settings.
- Alternative interventions to improve retention in care such as phoning the day before an appointment should be explored and tested in similar and different contexts.

INTRODUCTION

Reducing loss-to-follow-up (LTFU) rates among ambulatory patients on antiretroviral treatment (ART) remains a major challenge in both rich and resource-limited settings (Weigel 2011, Narchega et al 2010, Brinhoff et al 2009, Chi-Chen et al 2008, Tweya 2010, Kwong-Leng Yu 2007). Using an existing community based Non Government Organization (NGO) network to trace patients LTFU in a slum setting is an innovative approach not widely described. One example of using community based organizations (CBOs) to connect high risk inner city populations in New York to health services is described by Indyk and Rier (2006). Whilst this does not refer specifically to tracing patients LTFU and is linked to the provision of specialist medical services to hard to reach populations, it does promote the idea of using CBO members and their capacity of 'intimate primary attachment in cases where family ties are weakened to satisfy unmet needs, providing a doorway to life saving treatment'(Indyk 2006) for people living with HIV/AIDS (PLWHA). A similar usage of CBOs to provide peer-based patient follow up in the community is also being trialled by the National Aids Control Organization (NACO) in some ART centres in India.

Avoiding delays in scheduled appointments is vital in maintaining consistent drug supplies for patients to avoid ART interruption and subsequent viral rebound. The possibility that both delayed appointment and LTFU rates may be reduced in PLWHA living in low resource settings by the utilization of similar community based networks was the primary motivation for the following study. The study describes how a loosely organized community-based NGO network currently provides tracing for patients late for appointments and those LTFU for a Médecins Sans Frontières (MSF) HIV clinic in Mumbai, India.

Background

India has the third largest number of people living with HIV in the world (UNAIDS 2009, UNGASS 2010). An estimated 80% of HIV infections in Mumbai is considered to be heterosexually transmitted (AVERT HIV/AIDS website; UNAIDS 2009). The prevalence of HIV in the city is estimated to be 0.5% (AVERT HIV/AIDS website; UNAIDS 2009). Access to affordable health care is limited for all except the most wealthy. Whilst the private sector has the capacity to provide an advanced standard of health care, the public sector functions as a low resource option most of the time (Patil 2002, World Bank 2001) .

The HIV-Clinic was initiated in 2006 to provide access to Antiretroviral Therapy (ART) for ambulatory patients unable to obtain care from the public ART centres. Retrospective examination of clinic records indicated that by the end of 2009 the LTFU rate at the Clinic was less than 1% which was considered unusually low given the setting and target population. Patients late for scheduled appointments in the clinic had also declined from 15% to 5%. This is potentially important from the point of view of the patient and programme outcomes. The period between scheduled appointments is directly related to patient ART supplies. Delayed appointments mean that patients are more likely to run out of ART contributing to viral resistance and viral rebound. **Patients returning after a gap in care or treatment often require the provision more acute medical and nursing interventions in order to be re-stabilized.** Such delays may compromise long term program outcomes and **adversely** affect survival rates. Ensuring patients keep scheduled appointments is vital for treatment success **and general wellbeing.** Information on approaches to limit delays in low resource settings is scarce.

Data collected by the World Health Organization from various ART programs in low resource settings suggest an average of 21% of patients are lost to follow up six months after starting

1
2
3 ART (Weigel 2011, Kwong-Leng 2007). By two years, in parts of sub Saharan Africa, as
4
5 many as 40% of patients are LTFU. Patient tracing is labour-intensive and time-consuming
6
7 **often taking up valuable nursing resources**; with around 34% of traced patients never being
8
9 found (Weigel 2011, Narchega 2010, Binkoff 2009 Kwong-Leng Yu 2007).
10
11

12 13 14 THE STUDY

15 16 17 Aim

18
19 The aim of the study is to describe the patient tracing activities performed by a NGO network
20
21 for the MSF HIV clinic in Mumbai. The clinic's low LTFU rate and the trend in delayed
22
23 appointments were investigated retrospectively to examine possible reasons, exploring a
24
25 widely held belief among the network that the low rates were somehow related to the
26
27 community network's tracing activities. Information was gathered to explore the acceptability
28
29 of the approaches used in the clinic to reduce delayed appointments.
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35 36 37 Design

38
39 The study design chosen was a mixed method, descriptive study involving quantitative
40
41 documentation of the trends in delayed scheduled appointments and LTFU and a qualitative
42
43 component to describe patient and staff experiences of tracing activities and to explore the
44
45 patient acceptance of the approaches currently used in the clinic to minimize delayed
46
47 appointments.
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51 52 53 Participants

54
55 The population of interest were ambulatory ART-users attending the Clinic and HIV/AIDS
56
57 NGOs providing patient tracing activities for MSF. Key Informants also included five clinic
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1
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3 staff directly involved in tracing at the clinic level as well as NGO representatives who were
4
5 purposively selected to ensure experience of outreach work.
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9
10 Current clinic patients were purposively selected to try to obtain a sample that reflected both
11
12 the typical social and demographic characteristics of the cohort and the not so typical. The
13
14 sample included patients ranging in age from twenty-eight to fifty-five and a mixture of male
15
16 and female patients and transgender in proportions reflective of the current cohort mix. Both
17
18 patients with experience of missed appointments and those who had never missed an
19
20 appointment were included. Patients on ART were selected from the clinic register each
21
22 morning for four weeks until qualitative data saturation was reached at thirteen patients.
23
24 The inclusion criteria included current patients aged 18 years or more who agreed to
25
26 participate and all NGOs that worked regularly with the clinic to trace patients. Patients
27
28 recently transferred from MSF to government ART centres, were also included, as were key
29
30 clinic staff involved in tracing activities. Patients less than 18 years were excluded for ethical
31
32 reasons and because they made up so few of the cohort. Patients communicating principally in
33
34 a language unable to be translated by the locally recruited translator were also excluded. NGO
35
36 exclusion criteria included any HIV/AIDS NGO not working with MSF and those not
37
38 working with people living with HIV/AIDS or any Organization in the tracing network that
39
40 did not agree to participate in the study.
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46 Data collection

47 48 *Quantitative*

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3 Monthly project monitoring data was obtained from the existing monitoring tools used in the
4
5 clinic [FUCHIA (Follow Up and Care of HIV Infection and AIDS, Epicentre, Paris France)]
6
7 and Excel data bases retrospectively from 2006 to the end of 2010. This was collected and
8
9 analyzed in January 2011.
10

11 12 13 *Qualitative*

14
15 Qualitative data collection took place over a one month period from mid January to Mid
16
17 February 2011. Semi-structured interviews were conducted the afternoon following
18
19 recruitment in the morning. A total of thirteen patient interviews and nine key informant
20
21 interviews were conducted. Members of the NGO network were formally invited to attend
22
23 focus group discussions, or a personal interview. Written information explaining the study
24
25 was made available at all NGO meetings. Information sheets were posted around the clinic.
26
27
28 Two focus group discussions were performed with NGO representatives. All nine groups
29
30 actively involved in patient tracing activities were represented, with discussion group sizes
31
32 ranging from seven to ten participants.
33

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36
37 Face to face semi structured interviews were conducted by the first co-author to elicit the
38
39 patients' knowledge of the NGO network and any experience of patient tracing activities in
40
41 the presence of the translator. Questions probed the knowledge of the NGO network, use of
42
43 other NGOs and their experience of missed and delayed appointments, the clinic, and NGO
44
45 patient tracing (home visits). Interviews ranged from 40 to 60 minutes in duration and were
46
47 taped recorded for later transcription. Responses were also interpreted into English during the
48
49 interview to enable the interviewer to understand responses and adapt the line of questioning
50
51 where necessary to try to elicit more information about a new idea.
52

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54
55 Interviews were also conducted with four NGO outreach workers and five clinic staff by the
56
57 same interviewer probing their knowledge of the NGO network and their experiences of
58
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1
2
3 tracing patients. In addition, two focus groups were conducted by the first co-author following
4
5 scheduled patient support group meetings at the clinic to triangulate the findings from the
6
7 semi structured patient and key informant interviews. The discussion groups lasted an average
8
9 of 1½-2 hours. Two focus groups were also conducted with NGO outreach workers. All
10
11 sessions were interpreted into English and tape recorded for later transcription.

12
13
14 Interview notes written by the interviewer during interviews (using the direct verbal
15
16 interpretations into English by the translator of the respondent's responses to the questions)
17
18 were also included in the data for analysis.
19

20 21 22 23 Ethical considerations

24
25 A number of ethical issues were considered by the researchers in the formation of the study
26
27 protocol. These included informed consent, patient vulnerability, the influence of caste, the
28
29 maintenance of confidentiality and data protection. The protocol was approved by the Curtin
30
31 University Ethics Committee and the MSF Ethics Review Board. The NGO community was
32
33 also involved in the consultation process.
34
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38

39 Data analysis

40 41 *Quantitative*

42
43 Description of the data and simple statistical analyses was performed using Excel and SPSS
44
45 (version 16.0, Chicago, IL). Chi-square test for trend was used; p-value was set at 0.05. Data
46
47 on late appointments and patients LTFU were used to calculate rates of attrition and retention
48
49 of all patients. For the purposes of clarity, lost-to-follow-up was defined as patients who had
50
51 defaulted on treatment for 3 months (Chalker 2008). A delayed appointment category was
52
53 included and describes patients who are late for their scheduled appointment, this being the
54
55 primary tracing activity occurring from within clinic. The assumption made here is that a
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3 patient who is persistently late for appointments is more likely to become a defaulter.

4
5 Delayed appointments therefore have been used as a proxy indicator of potential LTFU.
6
7

8 9 *Qualitative*

10
11 The two principal co-authors coded each interview transcription independently and the final
12
13 categories were compared and negotiated until consensus was reached (Garrison 2006). The
14
15 content of the focus group transcriptions were analysed in the same way.
16
17

18
19
20 Coding categories were developed using mixed coding methods. Where specific answers to
21
22 closed ended questions were required, closed coding was used. For the majority of the open
23
24 questions, the data was coded directly from the participant responses to questions using open
25
26 and axial coding methods to determine categories and form sub categories. The thematic
27
28 analysis was done manually by the first co-author and then again by the second co-author as a
29
30 way of cross checking the data, using content analysis to firstly discover repeated words,
31
32 ideas and themes, then comparing the categories and themes with those of the first co-author.
33
34 Saturation was deemed to have occurred when no new themes or sub categories or ideas were
35
36 revealed from the data. Descriptive quotes were chosen to demonstrate the main ideas and the
37
38 range of participant responses.
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45 **RESULTS - QUANTITATIVE**

46 47 **Delayed visits and loss-to-follow-up rates over time**

48
49 A total of 827 HIV-infected patients were registered in the HIV-clinic between January 1st
50
51 2006 and December 31st 2010. Out of these, 613 patients have been started on ART. By the
52
53 end of December 2010, among patients on ART, 65 had died (11%), 38 were LTFU (6%),
54
55 199 were transferred to public ART centres, once their clinical condition was stabilised
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3 (32%), and 311 patients were alive and in treatment (50%), followed up in the clinic. The
4
5 LTFU rate dropped from 9.2% at the end of 2008 to 0.3% by 2009 ($p<0.001$). (Figure 2) The
6
7 clinic has recorded an average of 3,900 consultations per year. Delayed appointments have
8
9 also reduced over time from 15.4% in 2006 to just 5% in 2010 ($p<0.01$). The decline in the
10
11 proportion of late appointments can be seen from mid 2008 with a much sharper decline
12
13 occurring in 2010 (Figure 1)
14
15

16 17 18 **FINDINGS - QUALITATIVE**

19 20 **Sample Characteristics**

21
22 Thirteen patient interviews were conducted. Patients ranged in age from twenty-eight to fifty-
23
24 five years, eight were male, three female and two transgender. This was generally reflective of
25
26 the overall gender proportion in the current cohort where $\frac{2}{3}$ of the cohort were male. Of the
27
28 sample, three were currently unemployed with one other engaged in irregular seasonal work.
29
30 Both Hijra (transgender) relied on daily donations to survive. Of the four employed
31
32 participants, three were self employed. Eight of the group reported having some family
33
34 support whilst five had no family contact.
35
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40 41 **Main Themes**

42
43 There were four major themes identified from the data.
44
45

46 47 ***Knowledge of the NGO network***

48
49 Of the thirteen patients interviewed none were aware of an NGO network. In contrast, all key
50
51 informants and NGO outreach workers were aware of the NGO network attributing to it a
52
53 high level of importance. This finding was not unexpected and is perhaps more a reflection of
54
55 the patients' position at the periphery of the network (Newman 2007, Harvey 2002, Krishna
56
57
58
59
60

1
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3 2001). Knowledge and experience of other NGOs and their activities was limited apart from
4
5 the point of initial contact for referral.
6
7

8 9 *Patient Tracing*

10
11 None of patients interviewed were aware of patient tracing activities and none had knowingly
12
13 experienced them. The idea of patient tracing was viewed as life saving and “something that
14
15 should be done.”
16

17
18 “It would provide an opportunity to know what the situation was, why the person wasn’t
19
20 coming, the person if they were sick could be brought for treatment.”
21

22
23 The reasons given for late or delayed appointments were usually work, family or illness
24
25 related.
26

27
28 “When I miss an appointment its like depending on the climate [at work].Now at
29
30 that time, say its monsoon or I have a school bus[to drive] even if I tell them I need a holiday
31
32 it depends if there is a substitute bus driver available. If there is, then they will allow. If there
33
34 isn’t, then I usually have extra medicine for two to four days. If I alone stop a bus [by going
35
36 for my appointment] then 400 students will be stranded...and 800 parents inconvenienced. I
37
38 am serving 400 students and from there I also get food....so every time a compromise and an
39
40 arrangement must be reached.”
41

42
43 Others who had never missed appointments commented that their strategy for avoiding
44
45 missed appointments included keeping appointments marked in a diary, setting the alarm on
46
47 their mobile phone and receiving a reminder call from the clinic the day before the
48
49 appointment was due.
50

51
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53
54 Among patients there was significant conflict around the idea of home visits, reflecting the
55
56 level of social isolation experienced by PLWHA in the community (Donley 2009, Smith 2008
57
58
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3 Pachankis 2007, Slade 2007). There was a strong appreciation that someone was willing to
4
5 care by visiting them, but most feared home visits because of the associated risk to privacy
6
7 and confidentiality in the slum setting. Such visits may inadvertently have revealed their HIV
8
9 status and precipitated lasting discrimination from the family and close-living neighbours
10
11 (Dahab 2011, Donely 2009, Greef 2008, Smith 2008, Pachankis 2007, Slade 2007)

12
13
14 “To discuss something especially if you have to use the words...those words we cannot speak.
15
16 Confidentiality cannot be maintained in a chawl system(refers to tenement building with
17
18 shared walls, water supply and toilet) because, lets say they explain about what medicines
19
20 have to be taken, then information regarding us will become known to others. That type of
21
22 discussion cannot be held in a chawl. If you go to a house and have this interview there then
23
24 people will not be able to speak so freely because the atmosphere around will not be so
25
26 conducive.”
27
28

29 Patient focus group discussions confirmed similar views to those expressed above.

30
31
32 “It would feel good but then our neighbour would ask for what they have come, what were
33
34 they asking, which medicine were they talking about.”

35
36 “Actually, it [home visit] is usually okay for the NGO people like the peer educators but for
37
38 those people who are defaulters and who are the persons we are trying to find, there is some
39
40 hesitation. Who is coming here, why is he asking about myself and my treatment? He is
41
42 scared in the sense that since he has come people will ask who is he and why has he come
43
44 here. There is a fear about it so they say don't make the effort to reach our houses. Some
45
46 NGOs love going to their [the client] places but there is a fear [because] neighbours will try to
47
48 get information.”
49
50

51 52 53 ***Stigma and Discrimination***

54
55 This theme was revealed repeatedly in patient interviews and focus group discussions(Dahab
56
57 2011, Golab 2009, Donely 2009). There was a persistent expression of fear and concern
58
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1
2
3 around the social consequences of being found positive and discrimination was reported in
4
5 varying forms by ten out of thirteen patient respondents.

6
7 “Nurses and doctors write “seropositive” in the patient’s file. It means the entire staff at the
8
9 hospital come to know. First, if they are a good doctor he(reacts) normally [to the person].
10
11 There are some doctors who are very bad in the way they speak”

12
13
14 “Depending whether the patient is male or female, they are kept in a remote corner [of the
15
16 ward]. We get many experiences like that”

17
18 All patients described well developed strategies to reduce exposure to discrimination and
19
20 avoid the possibility of forced disclosure of HIV status.

21
22
23 “We don’t speak in front of neighbours. We go behind closed doors”

24
25 “They don’t go to the nearest[health] centre. They go somewhere far because they feel
26
27 someone might see them and all.”

28
29
30 “Their phone is normally switched off. Sometimes they give another number or an incomplete
31
32 number. They give someone else’s name and address at times”

33 34 35 *Treatment*

36
37 Barriers to treatment access was a persistent theme throughout NGO and patient interviews.

38
39 NGO staff felt awareness about HIV had increased at the community level but there were still
40
41 many misconceptions. Patients often remained unaware of the benefits of ART. Patients and
42
43 NGO respondents voiced concern over restrictions around access to second line therapy.

44
45
46 “Some patients don’t know about ART, first line or second line. To ensure there is no
47
48 misunderstanding about the medicines in his mind, follow up is necessary.”

49
50 Only three patients interviewed reported missing ART for reasons of sickness or family
51
52 responsibilities. Patients felt that this was related to the fact that the clinic gave several days
53
54 extra medication beyond the date of the next scheduled appointment.
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3 “I do make a point to reach on the date of the appointment. If I am not able to come I send my
4
5 daughter to get the medicines”
6
7

8
9 Peer support was pivotal in getting the ‘right [correct] information’ to the patient regarding
10
11 ART and connecting them to [similar] others to return the LTFU to treatment (Kabore 2010,
12
13 Khan 2009, Koen 2008, Smith 2008, Nachega 2006, Finn, Merzel 2003).
14
15

16 “Because we are positive we feel like he is our brother, it’s a kind of relation between us.
17
18 Maybe he is getting a salary but he is visiting us to give a good service. On his visit he asks
19
20 about the problems. He brings balm and other medicines for us from his NGO.”
21
22

23 Breaches of confidentiality were reportedly common among medical and nursing staff in
24
25 public hospitals and ART centres. This exposed the patient to the consequences of unplanned
26
27 disclosure and discrimination, contributing to a failure to seek early treatment and to potential
28
29 LTFU (Donley 2009, Greef 2008, Smith 2008).
30
31

32 “In the case a nurse comes to know that a person has HIV then she will go and tell the entire
33
34 village”
35

36 Table 1 summarizes the main qualitative findings of the study.
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43 DISCUSSION

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45
46 The study demonstrated it is possible to reduce delays in scheduled appointments and have
47
48 low LTFU rates in urban slum settings. However there are a number of limitations to this
49
50 study that make it difficult to show a direct association between the LTFU rate and NGO
51
52 patient tracing activities. The size of the patient sample was small at thirteen participants,
53
54 which while sufficient for data saturation and reflective of the overall patient cohort
55
56 characteristics, was not adequate enough to generalise the findings to larger settings.
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5 The caste system remains a strong social influence in India and there may have been
6
7 unintended bias due to caste variation in group discussions that may have unintentionally
8
9 influenced individual participation and the qualitative findings.
10

11
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13
14 Of particular concern during the research planning was the clinic 'Staff-Patient-NGO'
15
16 relationship. The researchers, who were mostly MSF staff members, were concerned how
17
18 existing hierarchical relationships might influence the study participant recruitment, the study
19
20 implementation and the study findings (Benoit 2006, Liamputtong 2007). Using staff unknown
21
22 to the NGO members and patients significantly reduced the risks of unintended (and intended)
23
24 influence, but may have negatively affected the trust level of some participants, affecting the
25
26 overall rate of participant recruitment (Benoit 2006, Liamputtong 2007) and potentially
27
28 excluding some particularly vulnerable patients.
29
30
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34 It is possible the network of NGOs may have had unique characteristics that favoured this
35
36 setting rather than another. Each patient received regular adherence counselling at every
37
38 clinic visit and many patients now had the accumulated benefits of both counselling (and peer
39
40 support (Nachega 2006) .This may have influenced the overall late appointment and LTFU
41
42 rates.
43

44
45 Patients may have been more highly motivated to seek care and continue treatment because of
46
47 the difficulties in accessing reliable care in Mumbai. Less motivated, more vulnerable patients
48
49 may have given up seeking care after 'negative' experiences in the public system. The
50
51 patients may, therefore, be particularly loyal to the clinic.
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3 The investigators had hoped to avoid the pitfalls of native speakers by employing a
4 professional translator but the impediments to providing a well trained, experienced translator
5 were both contextual and structural.
6
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8

9
10
11 Despite these limitations, the study has provided some very interesting findings that are
12 particularly important at the programmatic level. The initiative described shows promise in
13 its potential to reduce LTFU but it is likely this is not the only reason for the low LTFU.
14
15 Other factors relating to delayed appointments may also have been just as important here.
16
17 The late appointment follow-up system may have been being done more systematically than
18 when the clinic first began (Carre 2008, Tulsy 1999, Gregory 1992). Patients who had been
19 attending the clinic regularly for some time may have developed a strong bond with the staff
20 whom they saw regularly (Indyk 2006). Many had also been exposed to a significant amount
21 of regular adherence counselling and ongoing peer support. The clinic had a small cohort
22 compared to some other HIV projects which provides an opportunity for continuity of
23 medical and nursing care not always possible in larger projects. Whilst this may have also led
24 to a selected cohort who were particularly loyal to the clinic and may have also facilitated the
25 formation of primary attachment relationships with some staff over time, especially for those
26 patients lack family support (Indyk 2006).
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45 Some of decline in delayed appointment rates may have also been related to beginning a
46 scheduled appointment system late in 2009, organized by the clinic nurses to reduce patient
47 waiting times (Hardon 2007). The importance of early appointment follow up was then re-
48 emphasised with all patients and staff at this time with the receptionist receiving additional
49 training about the importance of phoning the patient promptly to reschedule delayed and
50 missed appointments. For those patients not contactable the same day, the receptionist refers
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3 them to a counsellor to follow up. If no contact is made here it is only at this point NGO
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5 tracking is instigated.
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10 The existence of a well structured delayed appointment follow up system in the clinic may
11
12 have significantly influenced the delayed appointment decline and subsequent LTFU rates,
13
14 supporting recent similar findings by Tweya in Malawi (2010). It is likely the consistent early
15
16 follow up of delayed appointments may also prevent some patients from becoming LTFU.
17

18 The qualitative data identified patients' overall experience of the clinic, the comprehensive
19
20 approach to care, and the continuity of staff relationships with the patient as important factors,
21
22 coming through strongly in patient focus groups as being important for patient retention. The
23
24 experience at the MSF clinic was compared regularly throughout the discussion with the more
25
26 'negative' experience of the government centres. The MSF clinic was described as being 'like
27
28 our own family members'. All of these factors are widely known to influence adherence to
29
30 treatment and patient retention. Perhaps it was these aspects as well as the systematic
31
32 approach to patient follow up that accounted for the clinics decline in delayed appointments
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34 and low LTFU.
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38 The strong decline in delayed appointments and the description of the methods of
39
40 appointment follow up used in the clinic were important in demonstrating a successful
41
42 approach to reduce delayed appointments that is acceptable to patients, avoiding disruption to
43
44 ART supply and the resulting viral rebound so contributing to long term survival. A
45
46 structured approach and early follow up of delayed appointments can be successfully
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48 performed by trained non-nursing staff, avoiding the unnecessary burden of using scarce
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50 nursing resources on patient follow-up. Simple measures such as a telephone call reminder
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52 regarding appointments was appreciated by patients and could be easily implemented in small
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3 to medium sized projects. The qualitative data clearly demonstrated the patient acceptability
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5 of such approaches to avoid delayed appointments in the clinic.
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7 Other findings pointed to a lack of knowledge about the function of and availability of
8
9 antiretrovirals in the public sector and a perception of limited access to second line treatment.
10
11 Given that the peer relationship appeared to be highly valued by most patient participants in
12
13 this study it is perhaps appropriate for important health messages for patients to be channelled
14
15 through a peer- based network such as the model described. Regular opportunities for peer
16
17 training are provided in the clinic and the trainings could be regularly facilitated by nurses in
18
19 other programmes to ensure the accuracy of the health information. A shift in the focus of
20
21 patient education from HIV transmission to treatment literacy may also be appropriate in this
22
23 context.
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26
27 A lack of privacy and confidentiality at home and in the public hospital setting was a
28
29 persistent theme throughout the qualitative data and is known to be a significant factor in
30
31 cases lost –to-follow-up (Greef et al 2008). Nurses and Doctors were identified as the main
32
33 culprits for failing to maintain confidentiality regarding a persons HIV status in the hospital
34
35 setting and family and neighbours, at home. Given the significant psychological and social
36
37 consequences of forced disclosure it is imperative that systems are put in place to protect
38
39 patient identity and maintain confidentiality in all clinic settings and that home visits by
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41 health workers are discouraged in settings such as a slum where privacy and confidentiality
42
43 cannot be guaranteed. Clinic-centered care may be more appropriate here.
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49 CONCLUSION

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52 The analysis of the monitoring data at the MSF clinic revealed a low LTFU rate and a
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54 declining trend in the numbers of delayed over time. This is unusual given the setting and
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56 target population (Weigel 2011 Tweya 2010, Jose 2008, Kebede 2006 Erstad 2005). The
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3 collaboration between the clinic and the existing local community based NGOs to formulate
4
5 an effective LFTU tracing network model was shown to be feasible and has implications for
6
7 other HIV clinics with limited staff resources or barriers of distance and time. Whilst the
8
9 clinics low LFTU rate cannot be clearly attributed to the networks tracing activities in this
10
11 study, its role in reducing LTFU rates and improving adherence by providing peer to peer
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13 counselling cannot be ruled out.
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17 Lost-to-follow-up tracing was perceived as a useful way to bring patients back to treatment by
18
19 patients and providers but home visits should be avoided in a slum setting because of the high
20
21 risk of HIV status exposure and lasting discrimination. Other methods of tracing need to be
22
23 explored. Patients reported that a telephone reminder the day before a scheduled was the
24
25 single most useful intervention to assist them in avoiding missed appointments. **The reported**
26
27 **lack of confidentiality among staff in some treatment centres is concerning and remains a**
28
29 **significant barrier for the successful return of patients lost- to-follow-up everywhere.**
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32
33 **Other programmes should consider using community-based peer networks for patient tracing**
34
35 **where nursing resources are limited or there are barriers of transport or distance. The**
36
37 **programs may undertake the systematic and early follow up of delayed appointments using**
38
39 **designated trained staff, to ensure confidentiality, reduce risks associated with antiretroviral**
40
41 **treatment interruption and reduce the potential for loss-to-follow-up. Programs may provide a**
42
43 **telephone reminder or text to patients the day before an appointment to assist in avoiding**
44
45 **delayed or missed appointments. Programs should consider providing several days of**
46
47 **antiretrovirals beyond scheduled appointment date to enable patient to contend with**
48
49 **unplanned delays and avoid the risk of treatment interruption. Finally, programs may consider**
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51 **avoiding home visits in settings where privacy is limited and HIV stigma and risk of**
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53 **discrimination is high.**
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REFERENCES

AVERT HIV/AIDS website; www.google.com/india-HIVdata/aidsportal accessed 15/06/1

Benoit, C, Jansson, M, Millar A, Phillips R; Community Academic Research on hard to reach populations: Benefits and Challenges 2005 in *Qualitative Health Research* 15 (2) 263-282

Binkoff M.W.G, Pujades-Rodriguez, M,Egger,M: Mortality of patients lost to follow up in anti retroviral treatment programmes in resource limited settings: Systematic review and meta-analysis, *PLOS ONE* Issue 6 June 2009 www.plosone.org

Chalker John; Monitoring Adherence and Defaulting for Antiretroviral Therapy in 5 East African Countries: An Urgent Need for Standards. *Journal of the International Association of Physicians in AIDS Care* JIAPAC, Vol. 7, No. 4, 193-199 2008

Carre, H, Boman, J, Osterlund, A, Garden, B, Nyknder, E: Improved Contact Tracing for *Clamidia Trachomtis* with Experienced tracers, tracing for 1 year back in time by phone in remote areas *STI* *BMJ.com* 2008

Chich-Chen-Chen,S, Kwong-Leung-Yu, J, Harries, A.D, Chin Nam Bong, Kobola-Dzmadzi R, Tok, T.S, King, C.C, Der Wang, J: Increased Mortality Male Adults with Aids related to poor compliance to antiretroviral therapy in Malawi *Tropical Medicine and International Health* Volume 13 number 4 PP 513-519 April 2008

Crespo-Fierro, Michele; Compliance/adherence and care management in HIV disease *Journal of the Association of Nurses in AIDS care* *HIV Disease: New Frontiers and Emerging Challenges* Volume 8, Issue 4 (July-August) 1997, Pages 43-54.

Dahab, M,Kielman,K, Charalambous,S, Kartaedt,A., Hamilton,R, la Grange, L, Fielding, K, Churchyard: Contrasting Reasons for Discontinuation of Antiretroviral therapy in the workplace and public sector HIV programes in South Africa. *AIDS Patient Care and STIs* Volume 25 Issue 1 January 8 2011

1
2
3 Donley, S.B; HIV in the Heartland: Negotiating stigma, disclosure and the HIV community.

4 Thesis Department Sociology, Anthropology and Social Work Kansas State University

5
6
7 2009.

8
9
10 Mayfield, A, Rice, E, Flannery, D, Rotheram-Borus, M,J: HIV disclosure among adults living

11 with HIV. AIDS CARE 20(1)PP 80-92 2008.

12
13
14 Erstad, Ida; The resurgence of tuberculosis in South Africa: an Investigation into

15 socioeconomic aspects of the Disease in a context of structural violence in Grahamstown,

16 Eastern Cape. A thesis submitted in fulfillment of the requirements for the degree of

17
18
19 Master of Arts of Rhodes University. SA December 2006

20
21
22 Finn, M, Srivkant, S: Quality of Life as a Mode of Governance: NGO Talk of HIV Positive

23 Health In India. Social Science and Medicine volume 66 Issue 7 PP.1568-1578

24
25
26 Garrison D.R M. Cleveland-Innes; Koole Marguerite; Kappelman, James; Revisiting

27 methodological issues in transcript analysis: Negotiated coding and reliability Internet and

28
29
30 Higher Education (9) 2006 1-8

31
32
33 [Guillford, M, Naithani, S, Morgan,M: What is Continuity of Care? Journal of Health Services](#)

34 [and Research Policy 1st October 2006 Volume 11 no.4 pp 248-250](#)

35
36
37
38
39
40
41 Greef, M, Phetlu,R, Makoae, L.N, Dlamini,P,S, Holzemer,W.L, Naidoo,J.R, Kohi, T.W,

42 Uys,L.R, Chirwa, M.L: Disclosure of HIV Status: Experiences and perceptions of person

43 living with HIV/AIDS and nurses involved in their care in Africa. Qualitative Health

44
45
46 Research. 18; 311 2008

47
48
49
50 Golab, Sarit, A, Tamassili, JC, Parsons, J,T:Partner serostatus and disclosure stigma:

51 Implications for physical and mental health outcomes among HIV positive adults. AIDS

52
53
54 Behavior 13 1233-1240 2009.

1
2
3 Gregory, M, M, Lohr, M,J, Gilgrist, LD: Methods for tracking pregnant and parenting
4 adolescents. Evaluation Review Volume 17, number. 1 February 1992 PP 69-81
5
6
7 www.sagepub.com/content/16/169 Accessed May 2011
8
9

10 Haggerty, J, L, Reid, K ,J, Freeman, G, K, Starfield, B, H, Adair, C, E, McHendry, R:
11
12 Continuity of Care : A Multi Disciplinary Review; BMJ 2003 November 22 327(7425) PP
13
14 1219-1221
15
16

17 Harvey, D: Agency and Community: A Critical Realist Paradigm. Journal for the Theory of
18
19 Social Behavior. 32(2) pages 163-194 2002
20
21

22 Hardon, A, P, Akurut, D, Comoro, C, Ekezie, C, Irundie, H,F, Gernts, T, Kalatawane, J,
23
24 Kinsman, J, Kwasa, R, Maridadi, J, Moroka, J,M, Moya, S, Nakiemba, A, Nsimba, S,
25
26 Ogeni, R, Oyabba, T, Temu, F, Laing, R: Hunger, Waiting Time and Transport Costs:
27
28 Time to Confront the Challenges to Antiretroviral Adherence in Africa: AIDS Care
29
30 Volume 19 Issue 5 May 2007 pages 6658-6665
31
32

33 Indyk D, Rier D, A. Wiring the HIV/AIDS System: Building Inter organisational
34
35 Infrastructure to link people, sites, and networks. Social Work Health Care. 2006;42(3-
36
37 4):29-45. Mount Sinai School of Medicine, New York, NY, USA. PMID: 1668 7373
38
39

40 Jose I, Figueroa-Munoz, Pilar Ramon-Pardo; Tuberculosis control in vulnerable groups World
41
42 Health Organization Bulletin Sept 2008 Volume 86 no 9 p 657-736.
43
44

45 Kabore,I, Bloem,J, Ethridge,G, Obiero,W, Waneless,S, Doykos,P, Ntsekhe,P, Mtsali,N,
46
47 Afrikaner, E, Sayed,R, Botswelo, J, Hani,A, Moshabesha,T, Kalaka,A, Mameja,J, Zwane,
48
49 N et al: The effect of community based support services on clinical Efficacy and Health
50
51 related quality of life in HIV/AIDS patients in resource limited settings in Sub Saharan
52
53 Africa. AIDS PATIENT CARE AND STDs Volume 24, number 9 2010
54
55
56
57
58
59
60

- 1
2
3 Kebede Deribel, Fikre Hailekiros, Sibhatu Biadgilign, Alemayehu Amberbir, Biruk Kebede
4
5 Beyene: Defaulters from anti retroviral therapy in Jimma University Specialized Hospital
6
7 South West Ethiopia. *Tropical Medicine and International Health* doi:10.1111/j.1365-
8
9 3156.2008.02006. Volume 13 no 3 PP 328–333
10
11
12 Khan, Zulfia; Mehnaz Saira; Khaliq Najam; Ansar Mohd Athar Razzaque; Abdul Siddiqui;
13
14 Poor Perinatal Care Practices in Urban Slums: Possible Role of Social Mobilization
15
16 Networks *Indian J Community Med.* 2009 April; 34(2): PP102–107. doi: 10.4103/0970-
17
18 0218.51229
19
20
21 Koen K A; Van Rompay; Madhivanan, Purnima; Rafiq, Miriam; Krupp1, Karl; Chakrapani,
22
23 Venkatesan; Selvam, Durai; Empowering the people: Development of an HIV peer
24
25 education model for low literacy rural communities in India. *Human Resources for Health*
26
27 2008, 6:6 doi:10.1186/1478-4491-6
28
29
30
31 -Krishna, A: Moving from the stock of social capital to the flow of benefits: the role of
32
33 agency. *World Development* 29(6) pages 925-943 2001.
34
35
36 Liamputtong, P. *Researching the Vulnerable; A guide to sensitive research methods* 2007
37
38 Sage Publications
39
40
41 Maskew, *Lost to Follow-up: Contributing Factors and Challenges in South African Patients*
42
43 *on ARV. South African Medical Journal* volume 97, Issue 9 p 853
44
45
46 Merzel, Cheryl, D'Afflitti, Joanna *Reconsidering Community-Based Health Promotion:*
47
48 *Promise, Performance, and Potential. American Journal of Public Health* 2003, April Vol.
49
50 93, No. 4
51
52
53 Narchega, J, Mills, E, Schechter, M; in Elliot, J and Shapiro, J.M(ed) : *Antiretroviral*
54
55 *adherence and retention in care in middle income and low income countries: Current-status*
56
57
58
59
60

1
2
3 of Knowledge and Research priorities. *Current Opinion in HIV AIDS*; volume 5, Issue 1
4
5 January 2010 PP. 70-77
6

7 Nachega, Jean B; Knowlton, Amy R; Deluca, Andrea; Schoeman, Jan H; Watkinson, Linda;
8
9 Efron, Anne; Chaisson, Richard E; Maartens, Gary: Treatment Supporter to Improve
10
11 Adherence to Antiretroviral Therapy in HIV-Infected South African Adults: A Qualitative
12
13 Study *JAIDS* December 2006 - Volume 43 - Issue - PP S127-S133
14
15
16

17 Newman, L, Dale, A: Homophily and Agency: Creating Effective Sustainable Development
18
19 Networks. *Environment, Development, Sustainability* 9 PP 79-90 2007
20
21

22 Pachankis, J.E: The Psychological Implications of concealing a Stigma: A cognitive-affective
23
24 behavior model. *Psychological Bulletin* Volume 133, no.2 PP 328-345. 2007
25
26

27 Pearson, CR, Mieck, M, A, Pfiffer, J, Montoya, P, Jonasse, T, Cunguara, A, Rao, D, Glayd, S.S:
28
29 One year after ART Initiation: Psycho-social Factors associated with stigma and HIV
30
31 positive Mozambicans. *AIDS Behavior* 13, PP 1189-1196 2009
32
33

34 Rumptz, M, H, Sullivan, C, M, Davidson II, W, S, Basta, J: An Ecological Approach to
35
36 tracking Battered Women Over Time. *Violence and Victims* Volume 6. no.3 1991
37
38

39 Rowe K. A, Makhubele, B Hargreaves, J. R. J. Porter D, Hausler, HP, Pronyk, P: Adherence
40
41 to TB preventive therapy for HIV-positive patients in rural South Africa: implications for
42
43 antiretroviral delivery in resource-poor settings? *INT TUBERC LUNG DIS* 9(3):263-269
44
45 2005 The Union.
46
47

48 Slade, P, O'Neill, C, Simpson, A, J, Lashen, H: The relationship between perceived stigma,
49
50 disclosure patterns, support and distress in new attendees at an infertility clinic. *Human*
51
52 *Reproduction*, Volume 22, Issue 8 June 2007
53
54
55
56
57
58
59
60

- 1
2
3 Smith, R.S, Rosetto, K, Peterson, L: A meta-analysis of disclosure of ones HIV positive
4 status, stigma and social support. AIDS CARE Volume 20 November, PP.1266-1275;
5
6 2008.
7
8
9
10 Tweya, H, Dickman,Chagwera,G, F,Ben-Smith,A, Mwenyemasi,J, Chiputula,F, Boxshall,M,
11
12 Weigel, R, Andreas,J, Hosseinipour, M,Piri, S; Early active follow up of patients on
13
14 antiretroviral therapy(ART) who are lost to follow up: Back to care project in Lilongwe,
15
16 Malawi. Tropical Medicine and International Health, Volume 15 suppl. PP.82-89 June
17
18 2010
19
20
21 TKwong-Leng Yu, J, Chih-Chen-Chen, S, Kuo-Yang Wang, Chow Sung Chang,
22
23 Makombe,S,D,Schouten,E.J, Harries, A.D: Lessons from the Field: True Outcomes for
24
25 Patients on Antiretroviral therapy who are lost to follow up in Malawi. Bulletin. WHO
26
27 2007 85 PP 550-554
28
29
30
31 Tulsy,J,P, Long, H, L., Chesney, M: Tracking and Follow Up of Marginalized Populations:
32
33 A Review. Journal of Health Care for the Poor and Underserved. Volume 10 number. 4
34
35 November 1999
36
37
38 UNAIDS/WHO AIDS Epidemic Update November 2009, www.google.com/india/HIVdata
39
40 ,accessed. 15/06/10
41
42
43 Weigel, R; Hochgesang, M; Brinhoff M.W.G; Hosseinipour, M.C; Boxshall, M, Mhango,E;
44
45 Nikwazi,B; Tweya,H; Kamlaka,M; Changwera,F; Phiri,S: Outcomes and associated risk
46
47 factors of patients traced after being lost to follow-up from antiretroviral treatment in
48
49 Lilongwe, Malawi. BMC Infectious Diseases, 11;31 2011
50
51
52 WHO, UNAIDS,UNICEF: Towards Universal Access: scaling up priority HIV/AIDS
53
54 Interventions Progress Report 2010 accessed April 2011 www.who.int
55
56
57
58
59
60

World Bank 2001: India: Raising the Sights: Better Health Systems for India's Poor,
Washington DC HNP Unit India Report # 22304

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Table 1. Summary of Qualitative Findings	Responses
<ul style="list-style-type: none"> Most NGO workers and patients felt the tracing activities and peer counselling would assist LTFU patients return more quickly to treatment. 	Patients: 13/13 NGO staff: 4/4 Clinic staff: 5/5 FGD: 2/2
<ul style="list-style-type: none"> Telephoning the day before a scheduled appointment was perceived the most important intervention to avoid missed appointments by patients and staff. 	Patients: 10/13 NGO staff: 2/4 Clinic staff: 5/5 FGD: 2/2
<ul style="list-style-type: none"> Extra ART supply several days beyond scheduled appointments was helpful in contending with unplanned delays. 	Patients: 10/13 Clinic staff: 5/5 FGD: 2/2
<ul style="list-style-type: none"> Many patients expressed a desire not to have visits at home, preferring to meet outside their immediate community to avoid being recognized or overheard. The risks related to HIV exposure and forced disclosure of HIV status from inquisitive, close-living neighbours at home was for most, too grave a consequence. 	Patients: 10/13
<ul style="list-style-type: none"> Innovative strategies were adopted by some patients to avoid the risk of HIV disclosure, and by NGO workers to establish contact with LTFU patients. 	Patients: 7/13 NGO staff: 4/4
<ul style="list-style-type: none"> Peer support was considered pivotal to getting right information to the LTFU patients. 	Patients: 8/13 NGO staff: 4/4 Clinic staff: 3/5 FGD: 2/2
<ul style="list-style-type: none"> Patients reported a lack of information regarding other NGO activities and assistance available. 	Patients: 11/13 FGD: 2/2
<ul style="list-style-type: none"> Patients and NGO workers felt there was a lack of information about the availability of ART. 	Patients: 13/13 NGO staff: 4/4
<ul style="list-style-type: none"> Concern was expressed over the restricted access to second line therapy and delays in starting new treatment. 	Patients: 10/13 NGO staff: 4/4 Clinic staff: 3/5 FGD: 2/2

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3 Captions
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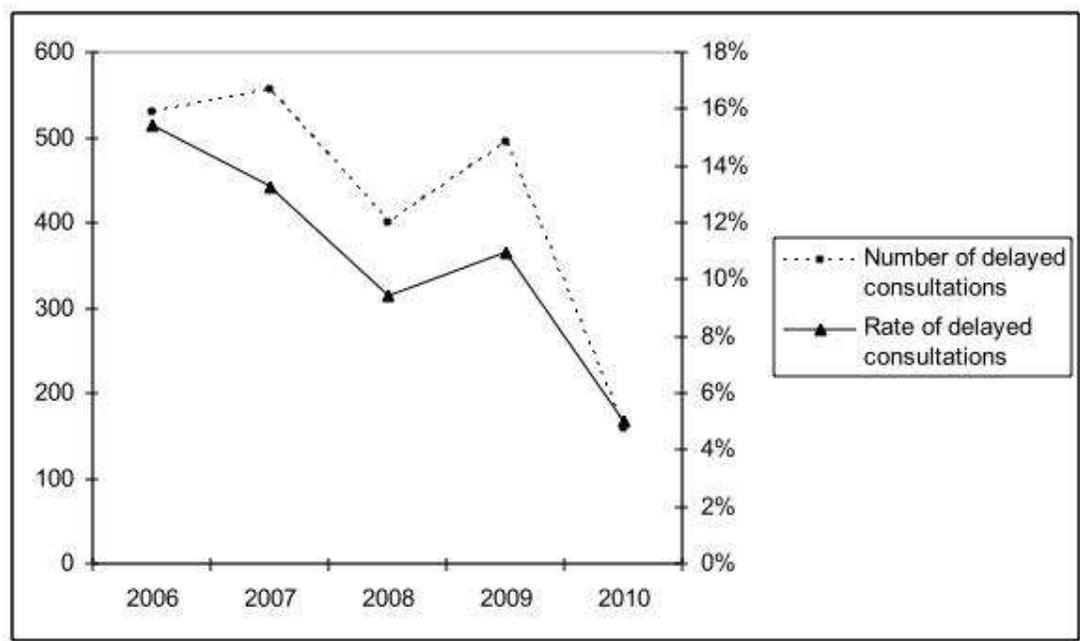
5 **Figure 1.** Delayed clinic consultations over time, Médecins Sans Frontières HIV-Clinic,
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8 Mumbai, India.

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10 **Figure 2.** Loss-to-follow-up over time, Médecins Sans Frontières HIV-Clinic, Mumbai, India.
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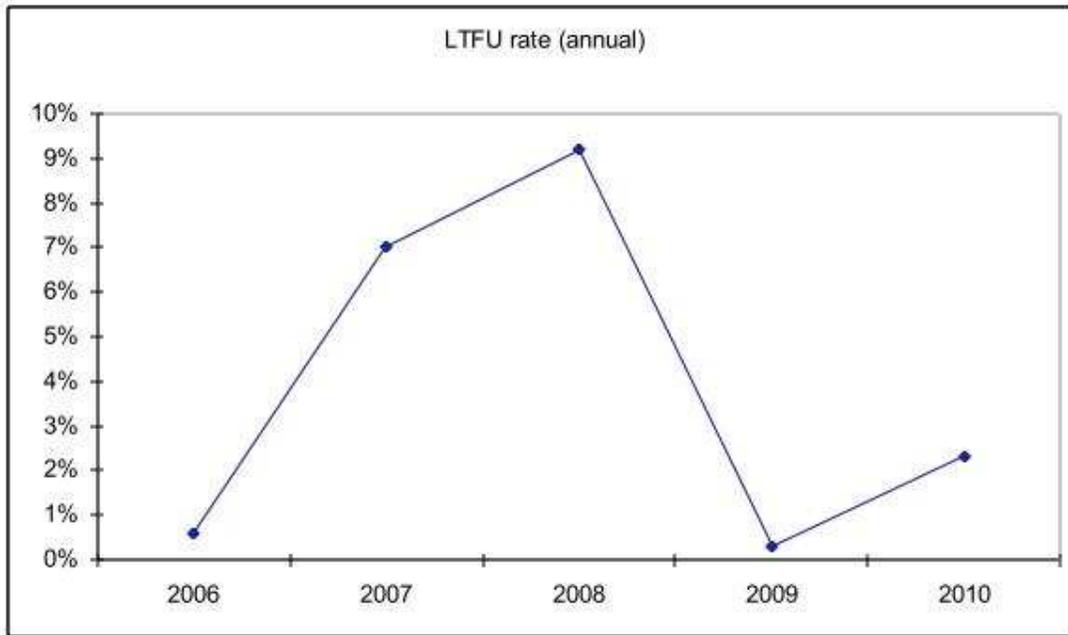
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Figure 1.



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Figure 2.



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